




RADIO TEST REPORT


Test Report No. : 32HE0238-HO-03-A

Applicant : Murata Manufacturing Co., Ltd.
Type of Equipment : Communication Module
Model No. : LBWA1ZZWL6
FCC ID : VPYLBWL
Test regulation : FCC Part 15 Subpart C: 2012
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: May 16 to 18, 2012

Representative test engineer: 
Takumi Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by: 
Masanori Nishiyama
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation. *As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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SECTION 1: Customer information

Company Name : Murata Manufacturing Co., Ltd.
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Telephone Number : +81-75-955-6375
Facsimile Number : +81-75-955-6634
Contact Person : Takaharu Kawakatsu

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Communication Module
Model No. : LBWA1ZZWL6
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 2.85, DC 3.4V
Receipt Date of Sample : May 15, 2012
Country of Mass-production : China
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system : 26MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 2412-2462MHz
Modulation : 11b: DSSS CCK, DQPSK, DBPSK
11g/n: OFDM-CCK 64QAM, 16QAM, QPSK, BPSK
Power Supply (radio part input) : DC 2.85V, DC 3.4V
Antenna type : Print Pattern Antenna
Antenna Gain : -1.2dBi
Operating temperature range : -20 to +55 deg. C.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on March 30, 2012 and effective April 30, 2012

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|--|---|---|----------|------------------------|
| Conducted Emission | FCC: ANSI C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4 | FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4 | QP 14.5dB, 24.93800MHz, N AV 6.3dB, 24.93800MHz, N | Complied | - |
| 6dB Bandwidth | FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.6.2 | FCC: Section 15.247(a)(2) ----- IC: RSS-210 A8.2(a) | See data. | Complied | Conducted |
| Maximum Peak Output Power | FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.8 | FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4) | | Complied | Conducted |
| Power Density | FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: - | FCC: Section 15.247 (e) ----- IC: RSS-210 A8.2(b) | | Complied | Conducted |
| Spurious Emission Restricted Band Edges | FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.9 | FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3 | 5.7dB 2400.00MHz, PK, Hori. | Complied | Conducted/ Radiated |
| 99% Occupied Bandwidth | IC: RSS-Gen 4.6.1 | IC: RSS-Gen 4.6.1 | N/A | - | Conducted |

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

-The stable voltage (DC2.85V) is constantly provided with the EUT through the regulator installed in the end product. Therefore, this EUT complies with the requirement.

-The RF Module has its own regulator.

The stable voltage (DC 3.4V) is constantly provided to the RF Module through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because it is soldered on the circuit board. Therefore the equipment complies with the requirement of 15.203/212.

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3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

| Test room (semi-anechoic chamber) | Conducted emission (+dB) |
|--------------------------------------|-----------------------------|
| | 150kHz-30MHz |
| No.1 | 3.5dB |
| No.2 | 3.6dB |
| No.3 | 3.6dB |
| No.4 | 3.6dB |

| Test room (semi-anechoic chamber) | Radiated emission | | | | | | |
|--------------------------------------|-------------------|------------------|-----------------|----------------|-----------------|-------------------|-------------------|
| | (3m*)(+dB) | | | | (1m*)(+dB) | | (0.5m*)(+dB) |
| | 9kHz -30MHz | 30MHz -300MHz | 300MHz -1GHz | 1GHz -10GHz | 10GHz -18GHz | 18GHz -26.5GHz | 26.5GHz -40GHz |
| No.1 | 4.2dB | 5.0dB | 5.1dB | 4.7dB | 5.7dB | 4.4dB | 4.3dB |
| No.2 | 4.1dB | 5.2dB | 5.1dB | 4.8dB | 5.6dB | 4.3dB | 4.2dB |
| No.3 | 4.5dB | 5.0dB | 5.2dB | 4.8dB | 5.6dB | 4.5dB | 4.2dB |
| No.4 | 4.7dB | 5.2dB | 5.2dB | 4.8dB | 5.6dB | 5.1dB | 4.2dB |

*3m/1m/0.5m = Measurement distance

| Power meter (+dB) | |
|-------------------|------------|
| Below 1GHz | Above 1GHz |
| 1.0dB | 1.0dB |

| Antenna terminal conducted emission and Power density (+dB) | | | Antenna terminal conducted emission (+dB) | | Channel power (+dB) |
|--|-----------|------------|--|---------------|------------------------|
| Below 1GHz | 1GHz-3GHz | 3GHz-18GHz | 18GHz-26.5GHz | 26.5GHz-40GHz | |
| 1.0dB | 1.1dB | 2.7dB | 3.2dB | 3.3dB | 1.5dB |

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test(3m)

The data listed in this test report has enough margin, more than the site margin.

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3.5 Test Location

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| | FCC Registration Number | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Other rooms |
|----------------------------|-------------------------|------------------------|----------------------------|--|------------------------|
| No.1 semi-anechoic chamber | 313583 | 2973C-1 | 19.2 x 11.2 x 7.7m | 7.0 x 6.0m | No.1 Power source room |
| No.2 semi-anechoic chamber | 655103 | 2973C-2 | 7.5 x 5.8 x 5.2m | 4.0 x 4.0m | - |
| No.3 semi-anechoic chamber | 148738 | 2973C-3 | 12.0 x 8.5 x 5.9m | 6.8 x 5.75m | No.3 Preparation room |
| No.3 shielded room | - | - | 4.0 x 6.0 x 2.7m | N/A | - |
| No.4 semi-anechoic chamber | 134570 | 2973C-4 | 12.0 x 8.5 x 5.9m | 6.8 x 5.75m | No.4 Preparation room |
| No.4 shielded room | - | - | 4.0 x 6.0 x 2.7m | N/A | - |
| No.5 semi-anechoic chamber | - | - | 6.0 x 6.0 x 3.9m | 6.0 x 6.0m | - |
| No.6 shielded room | - | - | 4.0 x 4.5 x 2.7m | 4.75 x 5.4 m | - |
| No.6 measurement room | - | - | 4.75 x 5.4 x 3.0m | 4.75 x 4.15 m | - |
| No.7 shielded room | - | - | 4.7 x 7.5 x 2.7m | 4.7 x 7.5m | - |
| No.8 measurement room | - | - | 3.1 x 5.0 x 2.7m | N/A | - |
| No.9 measurement room | - | - | 8.0 x 4.5 x 2.8m | 2.0 x 2.0m | - |
| No.10 measurement room | - | - | 2.6 x 2.8 x 2.5m | 2.4 x 2.4m | - |
| No.11 measurement room | - | - | 3.1 x 3.4 x 3.0m | 2.4 x 3.4m | - |

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

| Mode | Remarks* |
|---|-----------------|
| IEEE 802.11b (11b) | 11Mbps, PN9 |
| IEEE 802.11g (11g) | 6Mbps, PN9 |
| IEEE 802.11n SISO 20MHz BW (11n-20) | MCS 6, PN9 |
| *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) | |
| *Power of the EUT was set by the software as follows; Power settings: 5dBm Software: mfgtest Version: 5.90.153.52.1 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product. | |

*The details of Operating mode(s)

| Test Item | Operating Mode | Tested frequency |
|--|-------------------------------|-------------------------------|
| Conducted Emission | 11b Tx 11g Tx 11n-20 Tx | 2437MHz |
| Spurious Emission 6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth | 11b Tx 11g Tx 11n-20 Tx | 2412MHz 2437MHz 2462MHz |

Conducted emission test was performed for two power supplies and the data had the worst margin was attached.

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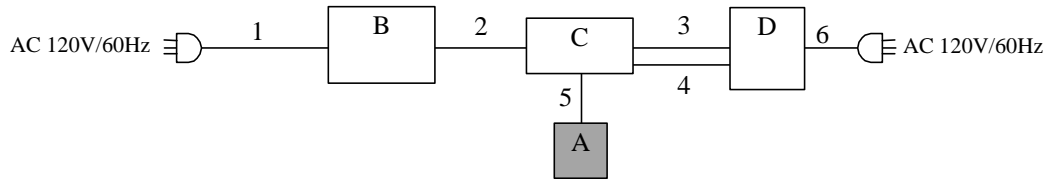
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

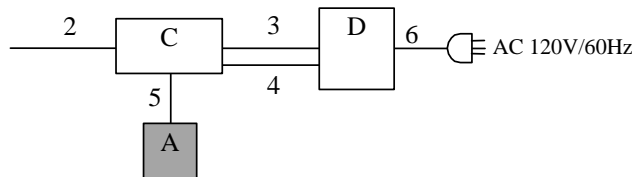
Facsimile : +81 596 24 8124

4.2 Configuration and peripherals

<Conducted emission test only>



<Other tests except for Conducted emission test>



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|----------------------|--------------|--------------------------------|--------------|---------|
| A | Communication Module | LBWA1ZZWL6 | 1 for CE, RE*1) 3 for AT*1) | MURATA | EUT |
| B | Power supply | PW8-3ATP | 09067054 | KENWOOD | - |
| C | Jig board | - | - | - | - |
| D | Power supply | PW18-1.3AT | 08016530 | KENWOOD | - |

List of cables used

| No. | Name | Length (m) | Shield | | Remarks |
|-----|--------------|------------|------------|------------|---------------------|
| | | | Cable | Connector | |
| 1 | AC Cable | 2.0 | Unshielded | Unshielded | - |
| 2 | DC Cable | 3.2 | Unshielded | Unshielded | For 2.85V supply |
| 3 | DC Cable | 1.5 | Unshielded | Unshielded | For 3.0V supply *2) |
| 4 | DC Cable | 2.4 | Unshielded | Unshielded | For 3.4V supply |
| 5 | Signal Cable | 0.02 | Unshielded | Unshielded | - |
| 6 | AC Cable | 2.0 | Unshielded | Unshielded | - |

*1) CE: Conducted Emission test
RE: Radiated Spurious Emission test
AT: Antenna Terminal Conducted tests

*2) This is supplied to Jig board only, not to RF part.

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

| | |
|--------------------------|---------------------|
| Detector | : QP and AV |
| Measurement range | : 0.15-30MHz |
| Test data | : APPENDIX |
| Test result | : Pass |

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SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

| | | | | |
|--------------|-------------|-----------------|----------------|------------|
| Frequency | Below 30MHz | 30MHz to 300MHz | 300MHz to 1GHz | Above 1GHz |
| Antenna Type | Loop | Biconical | Logperiodic | Horn |

| | | | |
|-----------------|----------------|--|----------------------------|
| Frequency | Below 1GHz | Above 1GHz | |
| Instrument used | Test Receiver | Spectrum Analyzer | |
| Detector | QP | PK | AV |
| IF Bandwidth | BW 120kHz(T/R) | RBW: 1MHz VBW: 3MHz | RBW: 1MHz VBW: 10Hz *1) |
| Test Distance | 3m | 3m (below 10GHz), 1m*2) (above 10GHz) | |

*1) The test was performed with VBW 10Hz since the EUT had no intervals during which the transmitter was off (see Appendix)

*2) Distance Factor: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-25GHz
Test data : APPENDIX
Test result : Pass

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SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

| Test | Span | RBW | VBW | Sweep time | Detector | Trace | Instrument used |
|---------------------------------|---|-----------------|--------------------|-------------------|----------------------|--------------|-----------------------------------|
| 6dB Bandwidth | 20MHz | 100kHz | 300kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99% Occupied Bandwidth | Enough width to display 20dB Bandwidth | 1 to 3% of Span | Three times of RBW | Auto | Peak | Max Hold | Spectrum Analyzer |
| Maximum Peak Output Power | - | - | - | Auto | Peak/ Average *4) | - | Power Meter (Sensor: 50MHz BW) |
| Peak Power Density | 20MHz | 30kHz | 100kHz | 667sec | Peak | Max Hold | Spectrum Analyzer *1) *2) |
| Conducted Spurious Emission *3) | 9kHz to 150kHz | 200Hz | 620Hz | Auto | Peak | Max Hold | Spectrum Analyzer |
| | 150kHz to 30MHz | 9.1kHz | 27kHz | | | | |
| | 30MHz to 25GHz (Less or equal to 5GHz) | 100kHz | 300kHz | | | | |

*1) PSD Option 1 of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".
*2) The test was not performed at RBW:3kHz however the measurement is to be performed with RBW:3kHz in the regulation, because, the measurement value with RBW:3kHz is less than the value of RBW:30kHz and the test data met the limit with RBW:30kHz.
*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)
*4) Testing using an average detector was performed in order to confirm that the output power of the EUT met the exclusion limits stated in FCC Part 2 Section 2.1093 and FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET 65 and the EUT was exempt from RF exposure SAR evaluation.

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : **APPENDIX**
Test result : **Pass**

APPENDIX 1: Data of EMI test

Conducted Emission
[DC2.85V]

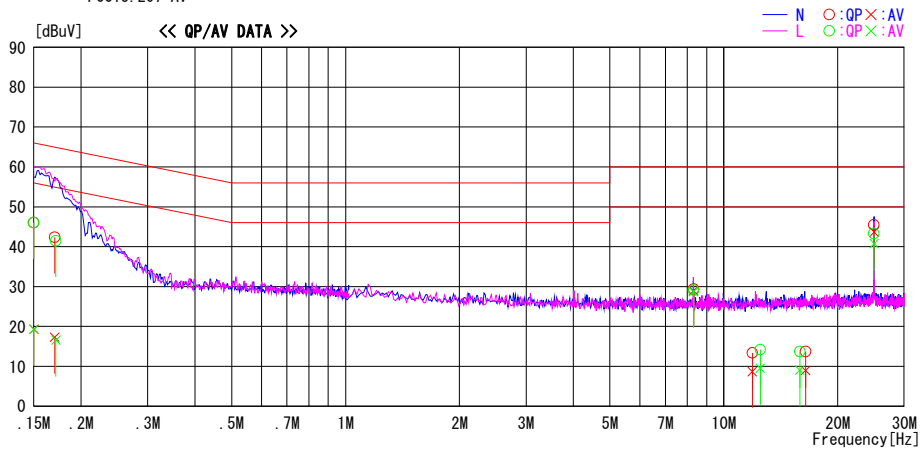
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/05/18

Report No. : 32HE0238-H0-03
Temp./Humi. : 24deg. C / 53% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 11b 2437MHz 11Mbps

LIMIT : FCC15.207 QP
FCC15.207 AV

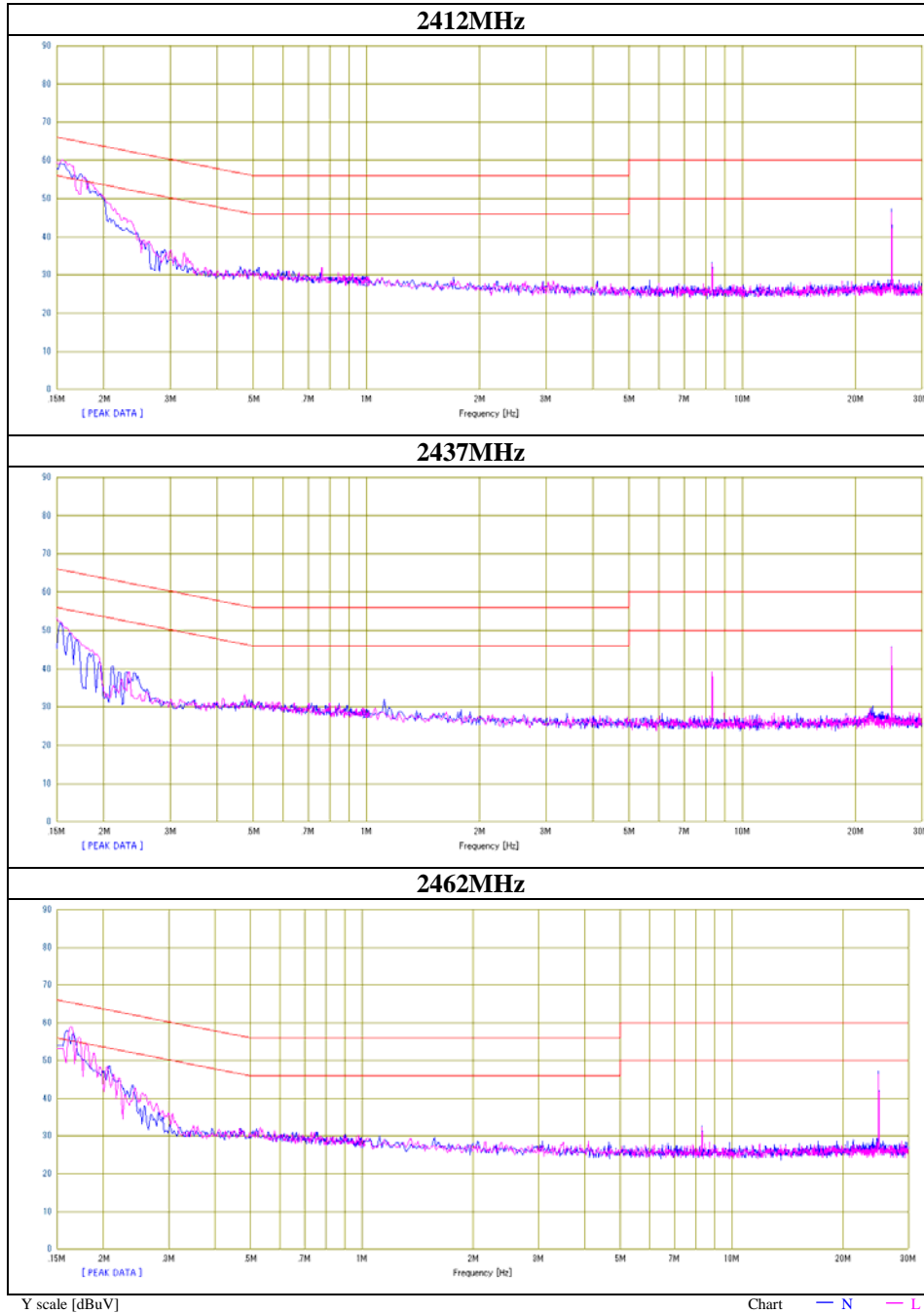


| Frequency [MHz] | Reading | | Level [dB] | Factor | Results | | Limit | | Margin | | Phase |
|--------------------|--------------|--------------|---------------|--------|--------------|--------------|--------------|--------------|------------|------------|-------|
| | QP [dBuV] | AV [dBuV] | | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | |
| 0.15000 | 32.7 | 6.0 | 13.3 | | 46.0 | 19.3 | 66.0 | 56.0 | 20.0 | 36.7 | L |
| 0.15000 | 32.7 | 6.0 | 13.3 | | 46.0 | 19.3 | 66.0 | 56.0 | 20.0 | 36.7 | N |
| 0.17030 | 29.1 | 4.0 | 13.3 | | 42.4 | 17.3 | 64.9 | 54.9 | 22.5 | 37.6 | N |
| 0.17175 | 28.2 | 3.3 | 13.3 | | 41.5 | 16.6 | 64.9 | 54.9 | 23.4 | 38.3 | L |
| 8.31300 | 15.4 | 15.0 | 14.0 | | 29.4 | 29.0 | 60.0 | 50.0 | 30.6 | 21.0 | N |
| 8.31300 | 15.1 | 14.7 | 14.0 | | 29.1 | 28.7 | 60.0 | 50.0 | 30.9 | 21.3 | L |
| 11.88600 | -0.9 | -5.6 | 14.3 | | 13.4 | 8.7 | 60.0 | 50.0 | 46.6 | 41.3 | N |
| 12.47600 | -0.1 | -4.8 | 14.3 | | 14.2 | 9.5 | 60.0 | 50.0 | 45.8 | 40.5 | L |
| 15.87720 | -0.8 | -5.4 | 14.5 | | 13.7 | 9.1 | 60.0 | 50.0 | 46.3 | 40.9 | L |
| 16.44200 | -0.8 | -5.5 | 14.5 | | 13.7 | 9.0 | 60.0 | 50.0 | 46.3 | 41.0 | N |
| 24.93800 | 30.7 | 28.9 | 14.8 | | 45.5 | 43.7 | 60.0 | 50.0 | 14.5 | 6.3 | N |
| 24.94120 | 28.5 | 26.0 | 14.8 | | 43.3 | 40.8 | 60.0 | 50.0 | 16.7 | 9.2 | L |

CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(PROBE LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission
[DC2.85V]

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 32HE0238-HO-03 |
| Date | 05/18/2012 |
| Temperature/ Humidity | 24 deg. C / 53% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11b Tx |



Conducted Emission
[DC2.85V]

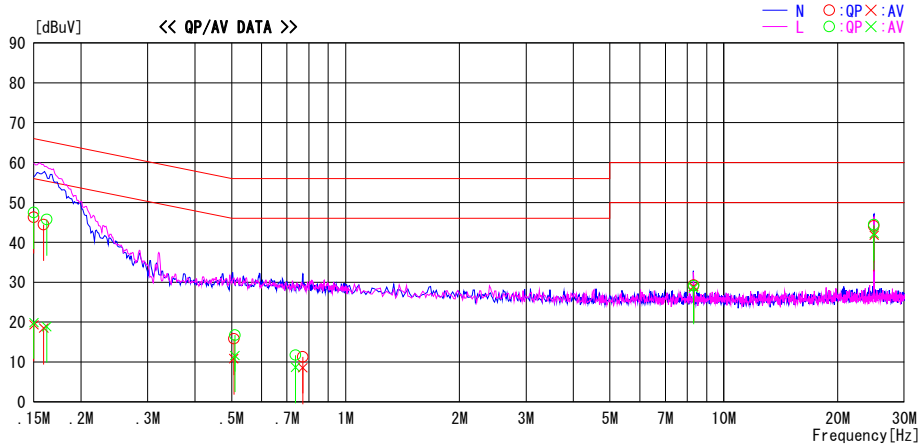
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/05/18

Report No. : 32HE0238-H0-03
Temp./Humi. : 24deg. C / 53% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 11g 2437MHz 6Mbps

LIMIT : FCC15.207 QP
FCC15.207 AV

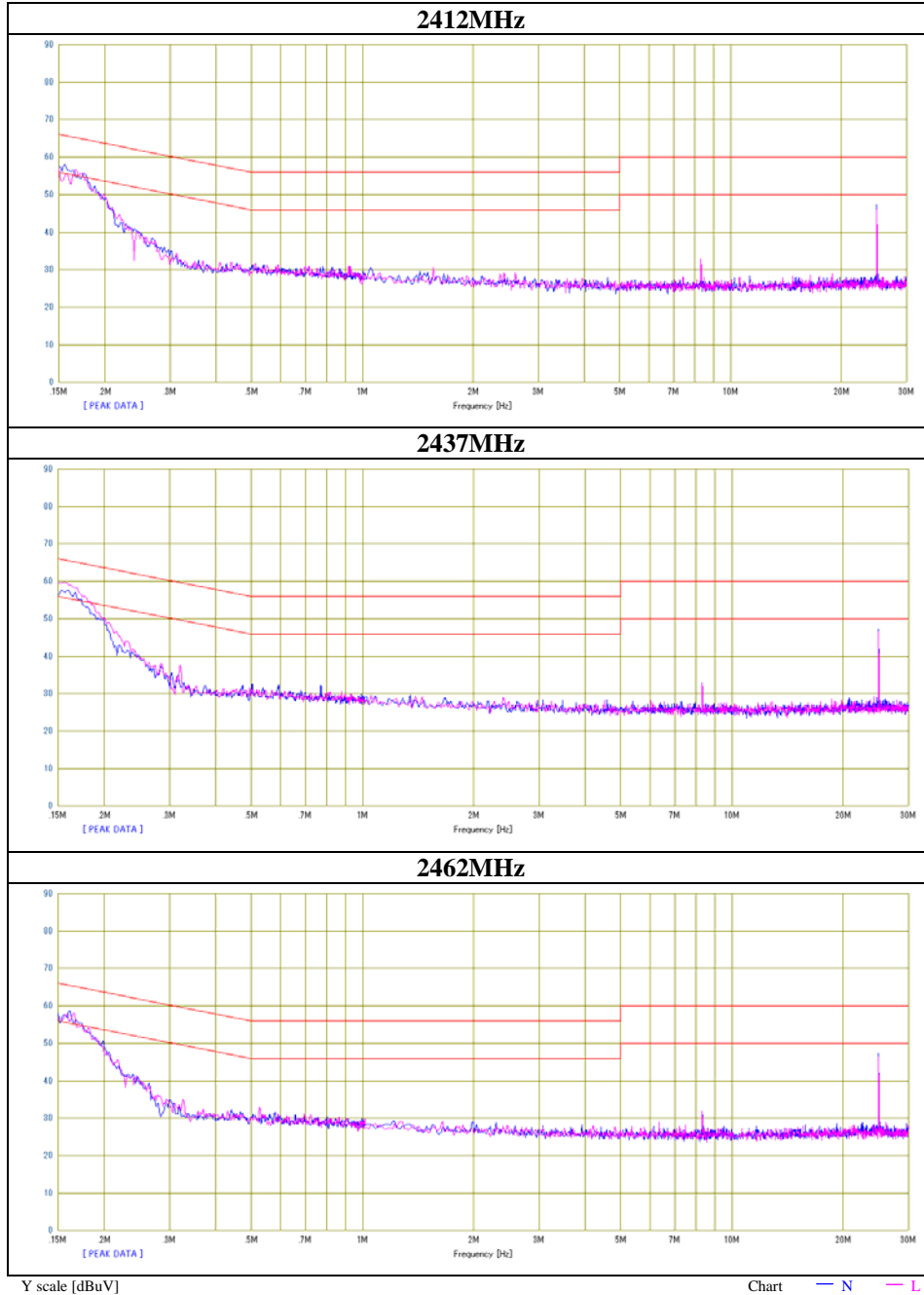


| Frequency [MHz] | Reading Level | | Corr. Factor [dB] | Results | | Limit | | Margin | | Phase |
|--------------------|---------------|--------------|-------------------------|--------------|--------------|--------------|--------------|------------|------------|-------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | |
| 0.15000 | 33.0 | 6.0 | 13.3 | 46.3 | 19.3 | 66.0 | 56.0 | 19.7 | 36.7 | N |
| 0.15920 | 31.2 | 5.2 | 13.3 | 44.5 | 18.5 | 65.5 | 55.5 | 21.0 | 37.0 | N |
| 0.50680 | 2.5 | -2.4 | 13.3 | 15.8 | 10.9 | 56.0 | 46.0 | 40.2 | 35.1 | N |
| 0.77060 | -2.0 | -4.7 | 13.3 | 11.3 | 8.6 | 56.0 | 46.0 | 44.7 | 37.4 | N |
| 8.31320 | 15.3 | 15.0 | 14.0 | 29.3 | 29.0 | 60.0 | 50.0 | 30.7 | 21.0 | N |
| 24.94120 | 29.3 | 27.0 | 14.8 | 44.1 | 41.8 | 60.0 | 50.0 | 15.9 | 8.2 | N |
| 0.15000 | 34.2 | 6.6 | 13.3 | 47.5 | 19.9 | 66.0 | 56.0 | 18.5 | 36.1 | L |
| 0.16220 | 32.4 | 5.6 | 13.3 | 45.7 | 18.9 | 65.4 | 55.4 | 19.7 | 36.5 | L |
| 0.51010 | 3.4 | -1.7 | 13.3 | 16.7 | 11.6 | 56.0 | 46.0 | 39.3 | 34.4 | L |
| 0.73760 | -1.6 | -4.6 | 13.3 | 11.7 | 8.7 | 56.0 | 46.0 | 44.3 | 37.3 | L |
| 8.31220 | 15.1 | 14.6 | 14.0 | 29.1 | 28.6 | 60.0 | 50.0 | 30.9 | 21.4 | L |
| 24.93840 | 29.7 | 27.4 | 14.8 | 44.5 | 42.2 | 60.0 | 50.0 | 15.5 | 7.8 | L |

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (PROBE LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission
[DC2.85V]

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 32HE0238-HO-03 |
| Date | 05/18/2012 |
| Temperature/ Humidity | 24 deg. C / 53% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11g Tx |



Conducted Emission
[DC2.85V]

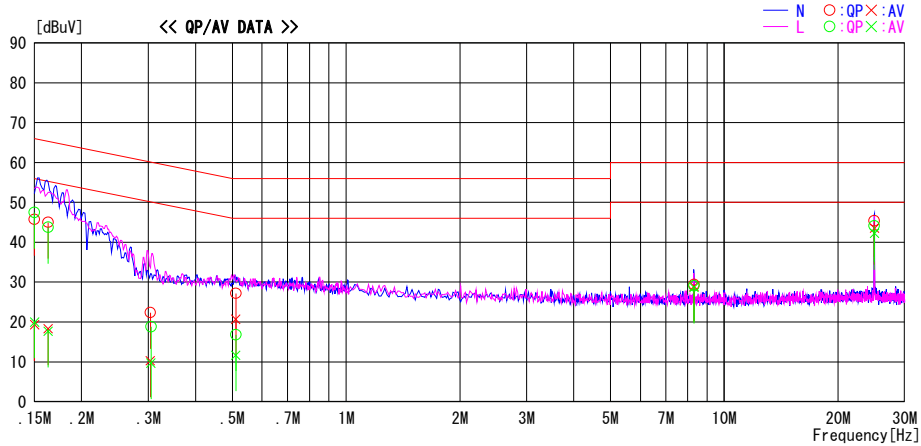
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/05/18

Report No. : 32HE0238-HO-03
Temp./Humi. : 24deg. C / 53% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 11n 2437MHz MCS6

LIMIT : FCC15.207 QP
FCC15.207 AV

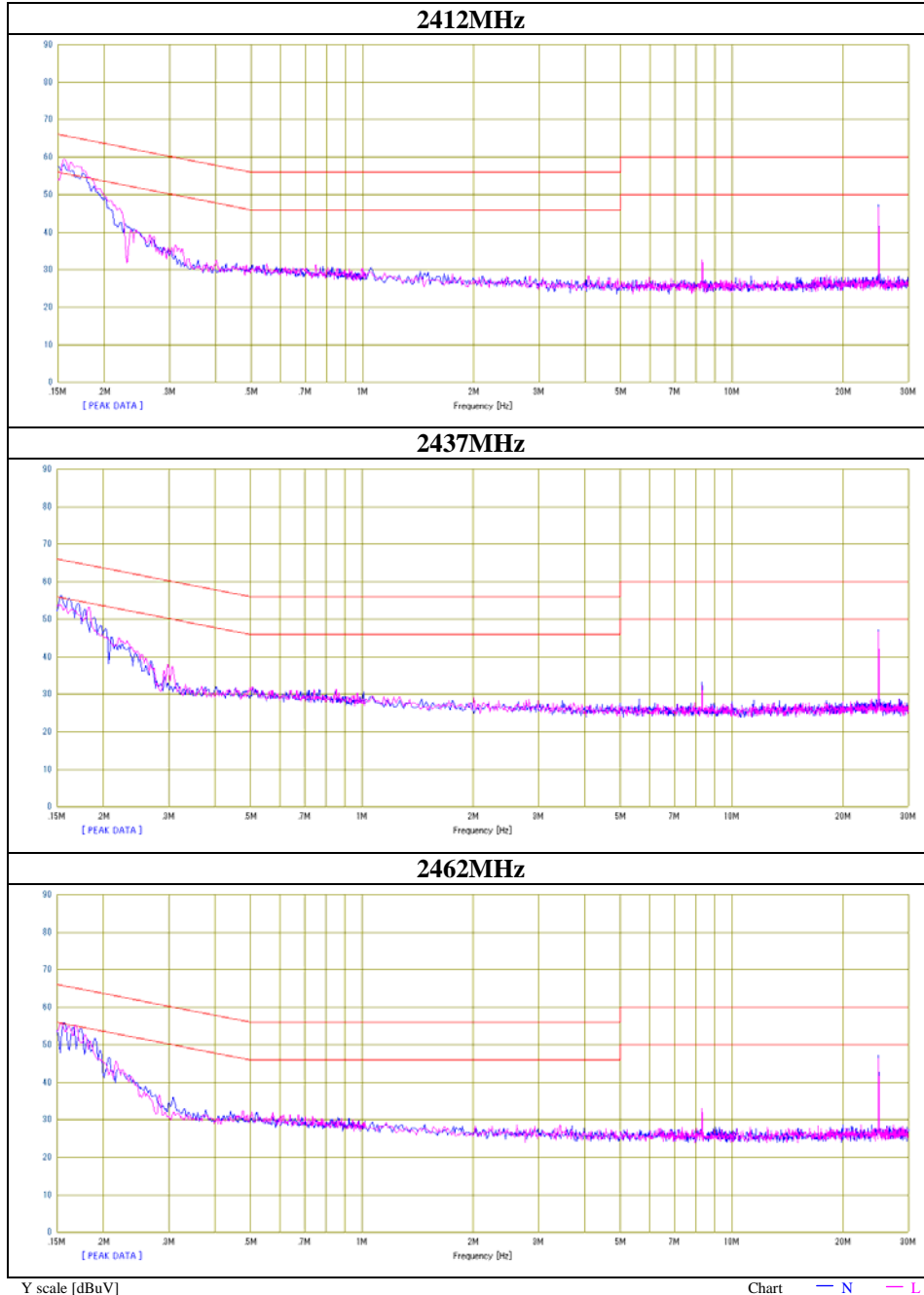


| Frequency [MHz] | Reading Level | | Corr. Factor [dB] | Results | | Limit | | Margin | | Phase |
|--------------------|---------------|--------------|-------------------------|--------------|--------------|--------------|--------------|------------|------------|-------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | |
| 0.15000 | 32.4 | 6.0 | 13.3 | 45.7 | 19.3 | 66.0 | 56.0 | 20.3 | 36.7 | N |
| 0.15000 | 34.2 | 6.7 | 13.3 | 47.5 | 20.0 | 66.0 | 56.0 | 18.5 | 36.0 | L |
| 0.16305 | 31.7 | 5.0 | 13.3 | 45.0 | 18.3 | 65.3 | 55.3 | 20.3 | 37.0 | N |
| 0.16305 | 30.4 | 4.4 | 13.3 | 43.7 | 17.7 | 65.3 | 55.3 | 21.6 | 37.6 | L |
| 0.30370 | 9.1 | -3.0 | 13.3 | 22.4 | 10.3 | 60.1 | 50.1 | 37.7 | 39.8 | N |
| 0.51122 | 13.9 | 7.4 | 13.3 | 27.2 | 20.7 | 56.0 | 46.0 | 28.8 | 25.3 | N |
| 0.30490 | 5.5 | -3.6 | 13.3 | 18.8 | 9.7 | 60.1 | 50.1 | 41.3 | 40.4 | L |
| 0.51110 | 3.5 | -1.6 | 13.3 | 16.8 | 11.7 | 56.0 | 46.0 | 39.2 | 34.3 | L |
| 8.31280 | 15.4 | 15.0 | 14.0 | 29.4 | 29.0 | 60.0 | 50.0 | 30.6 | 21.0 | N |
| 8.31284 | 15.1 | 14.7 | 14.0 | 29.1 | 28.7 | 60.0 | 50.0 | 30.9 | 21.3 | L |
| 24.93830 | 29.3 | 27.4 | 14.8 | 44.1 | 42.2 | 60.0 | 50.0 | 15.9 | 7.8 | L |
| 24.93860 | 30.6 | 28.7 | 14.8 | 45.4 | 43.5 | 60.0 | 50.0 | 14.6 | 6.5 | N |

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F (PROBE LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission
[DC2.85V]

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 32HE0238-HO-03 |
| Date | 05/18/2012 |
| Temperature/ Humidity | 24 deg. C / 53% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11n-20 Tx |



Conducted Emission
[DC3.4V]

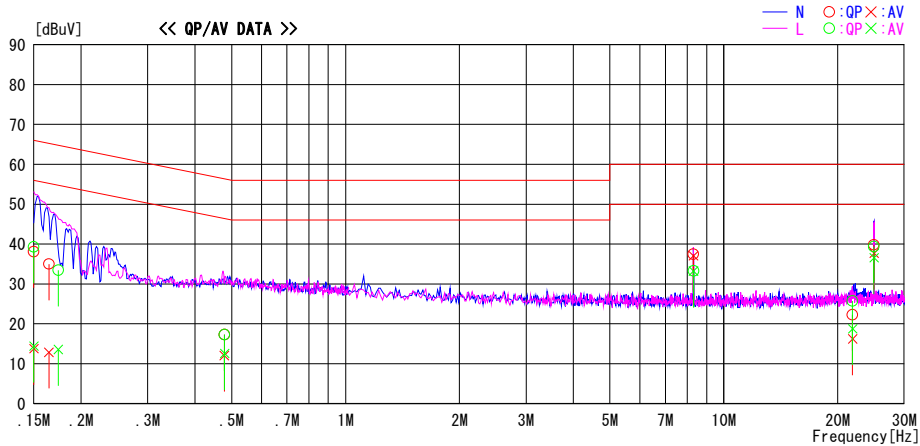
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/05/18

Report No. : 32HE0238-HO-03
Temp./Humi. : 24deg. C / 53% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 11b 2437MHz 11Mbps

LIMIT : FCC15.207 QP
FCC15.207 AV

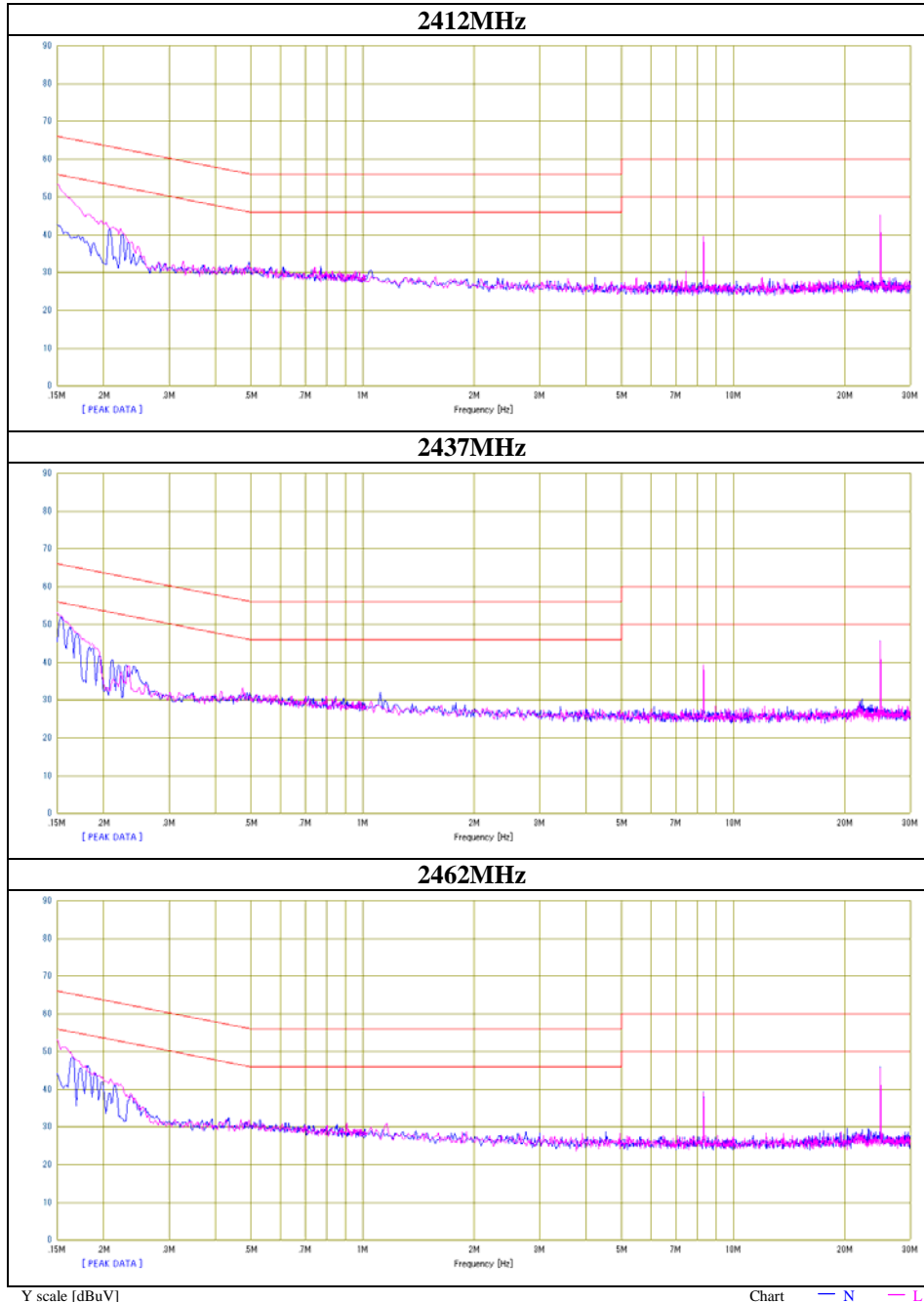


| Frequency [MHz] | Reading Level | | Corr. Factor | Results | | Limit | | Margin | | Phase | Comment |
|--------------------|---------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | | |
| 0.15000 | 24.8 | 0.5 | 13.3 | 38.1 | 13.8 | 66.0 | 56.0 | 27.9 | 42.2 | N | |
| 0.16450 | 21.7 | -0.4 | 13.3 | 35.0 | 12.9 | 65.2 | 55.2 | 30.2 | 42.3 | N | |
| 0.47820 | 4.0 | -1.2 | 13.3 | 17.3 | 12.1 | 56.4 | 46.4 | 39.1 | 34.3 | N | |
| 8.31160 | 23.5 | 23.1 | 14.0 | 37.5 | 37.1 | 60.0 | 50.0 | 22.5 | 12.9 | N | |
| 21.88380 | 7.6 | 1.5 | 14.7 | 22.3 | 16.2 | 60.0 | 50.0 | 37.7 | 33.8 | N | |
| 24.94350 | 25.0 | 22.9 | 14.8 | 39.8 | 37.7 | 60.0 | 50.0 | 20.2 | 12.3 | N | |
| 0.15000 | 26.0 | 1.1 | 13.3 | 39.3 | 14.4 | 66.0 | 56.0 | 26.7 | 41.6 | L | |
| 0.17414 | 20.2 | 0.3 | 13.3 | 33.5 | 13.6 | 64.8 | 54.8 | 31.3 | 41.2 | L | |
| 0.47920 | 4.0 | -0.7 | 13.3 | 17.3 | 12.6 | 56.4 | 46.4 | 39.1 | 33.8 | L | |
| 8.31288 | 19.3 | 19.2 | 14.0 | 33.3 | 33.2 | 60.0 | 50.0 | 26.7 | 16.8 | L | |
| 21.88260 | 11.0 | 4.1 | 14.7 | 25.7 | 18.8 | 60.0 | 50.0 | 34.3 | 31.2 | L | |
| 24.94240 | 24.6 | 21.8 | 14.8 | 39.4 | 36.6 | 60.0 | 50.0 | 20.6 | 13.4 | L | |

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (PROBE LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission [DC3.4V]

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 32HE0238-HO-03 |
| Date | 05/18/2012 |
| Temperature/ Humidity | 24 deg. C / 53% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11b Tx |



Conducted Emission
[DC3.4V]

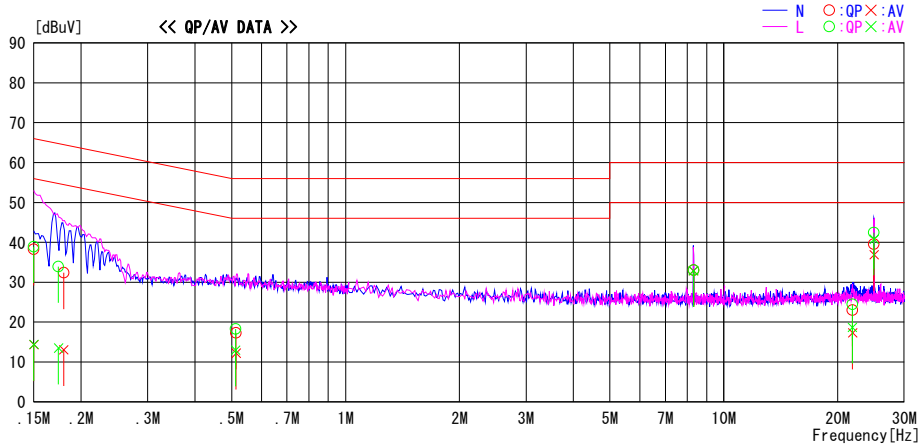
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/05/18

Report No. : 32HE0238-HO-03
Temp./Humi. : 24deg. C / 53% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 11g 2437MHz 6Mbps

LIMIT : FCC15.207 QP
FCC15.207 AV

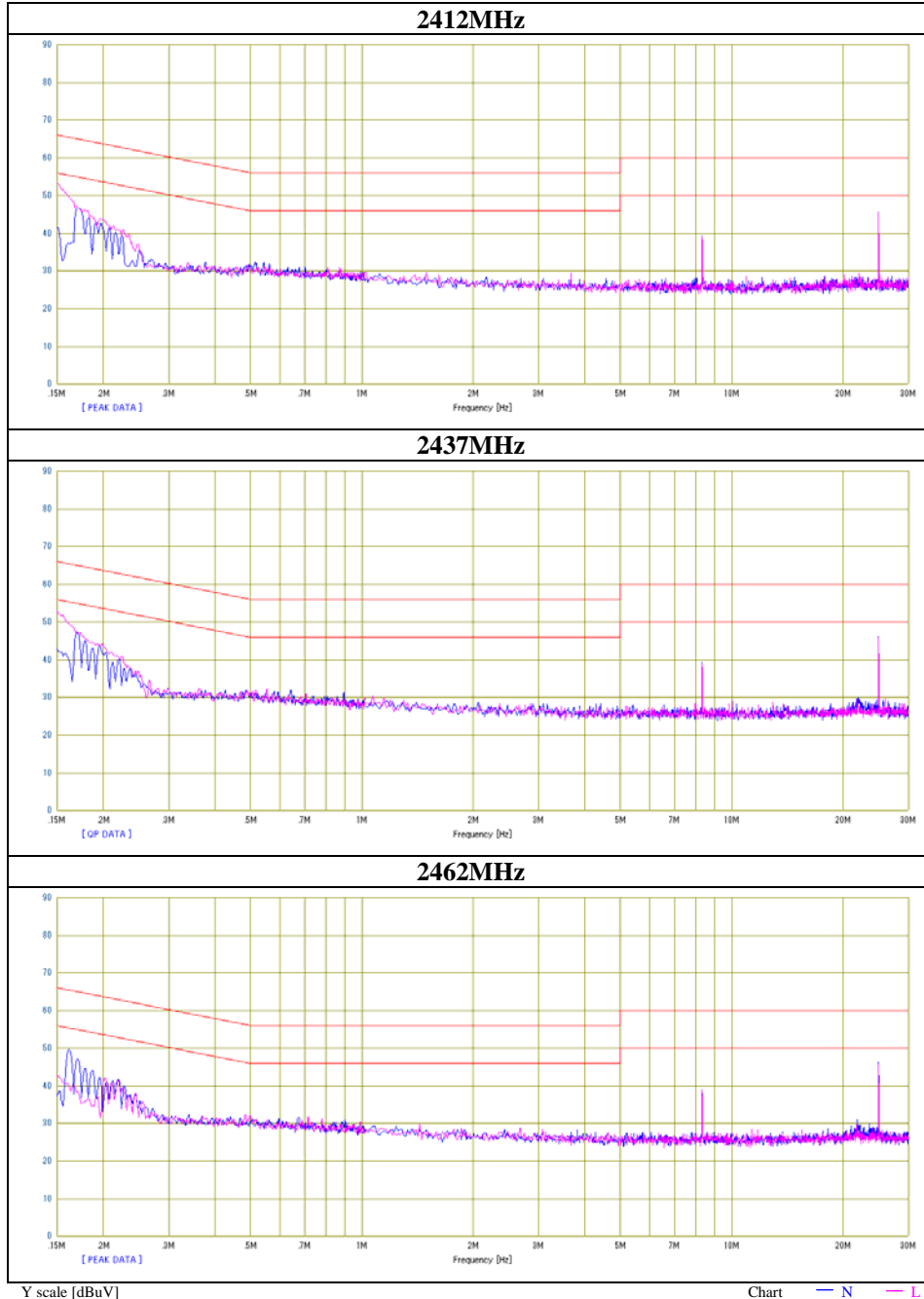


| Frequency [MHz] | Reading | | Corr. Factor | Results | | Limit | | Margin | | Phase | Comment |
|--------------------|--------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | | |
| 0.15000 | 25.0 | 1.0 | 13.3 | 38.3 | 14.3 | 66.0 | 56.0 | 27.7 | 41.7 | N | |
| 0.18010 | 19.1 | -0.2 | 13.3 | 32.4 | 13.1 | 64.5 | 54.5 | 32.1 | 41.4 | N | |
| 0.51430 | 4.0 | -1.1 | 13.3 | 17.3 | 12.2 | 56.0 | 46.0 | 38.7 | 33.8 | N | |
| 8.31220 | 19.0 | 18.9 | 14.0 | 33.0 | 32.9 | 60.0 | 50.0 | 27.0 | 17.1 | N | |
| 21.88820 | 8.3 | 2.6 | 14.7 | 23.0 | 17.3 | 60.0 | 50.0 | 37.0 | 32.7 | N | |
| 24.94312 | 24.8 | 22.1 | 14.8 | 39.6 | 36.9 | 60.0 | 50.0 | 20.4 | 13.1 | N | |
| 0.15000 | 25.6 | 1.1 | 13.3 | 38.9 | 14.4 | 66.0 | 56.0 | 27.1 | 41.6 | L | |
| 0.17433 | 20.6 | 0.2 | 13.3 | 33.9 | 13.5 | 64.8 | 54.8 | 30.9 | 41.3 | L | |
| 0.51230 | 5.0 | -0.3 | 13.3 | 18.3 | 13.0 | 56.0 | 46.0 | 37.7 | 33.0 | L | |
| 8.31289 | 19.0 | 18.9 | 14.0 | 33.0 | 32.9 | 60.0 | 50.0 | 27.0 | 17.1 | L | |
| 21.87230 | 9.8 | 4.0 | 14.7 | 24.5 | 18.7 | 60.0 | 50.0 | 35.5 | 31.3 | L | |
| 24.93710 | 27.7 | 26.0 | 14.8 | 42.5 | 40.8 | 60.0 | 50.0 | 17.5 | 9.2 | L | |

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (PROBE LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission
[DC3.4V]

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 32HE0238-HO-03 |
| Date | 05/18/2012 |
| Temperature/ Humidity | 24 deg. C / 53% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11g Tx |



Conducted Emission
[DC3.4V]

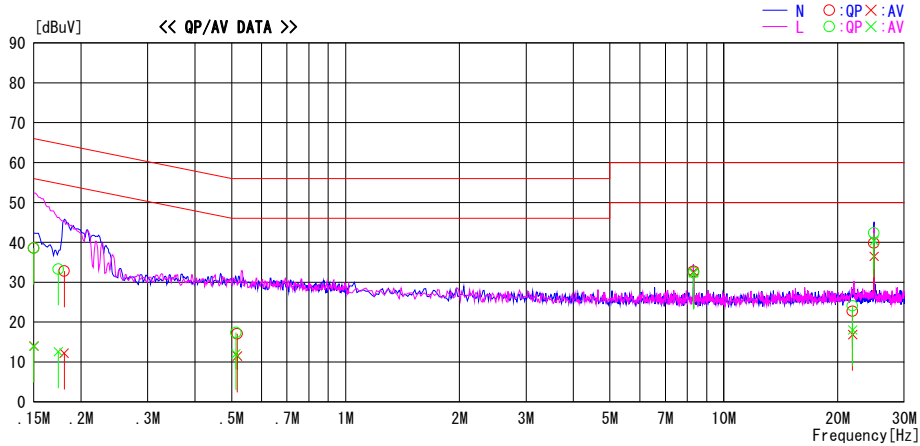
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/05/18

Report No. : 32HE0238-H0-03
Temp./Humi. : 24deg. C / 53% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 11n 2437MHz MCS6

LIMIT : FCC15.207 QP
FCC15.207 AV

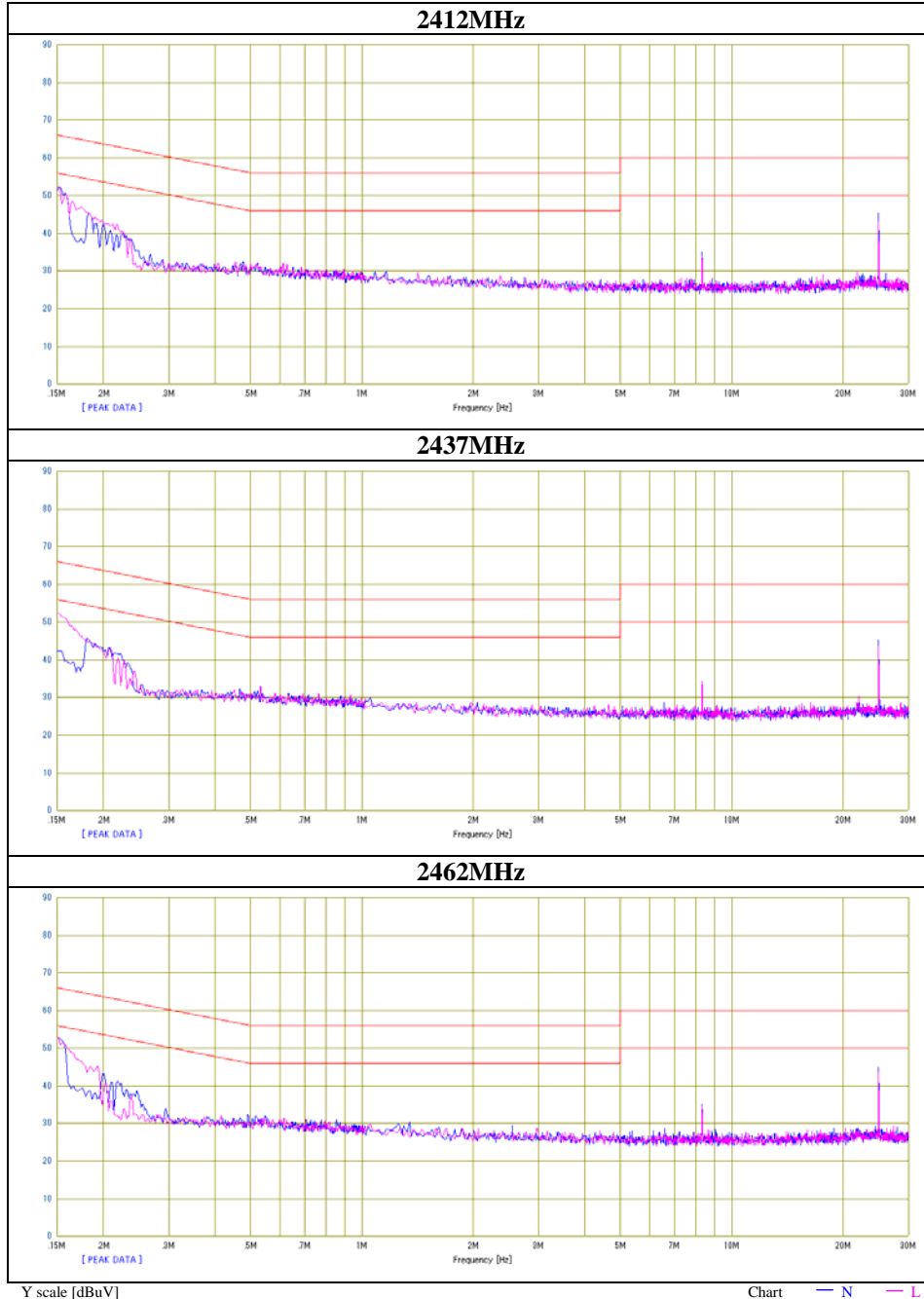


| Frequency [MHz] | Reading | | Corr. Factor [dB] | Results | | Limit | | Margin | | Phase | Comment |
|--------------------|--------------|--------------|-------------------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | | |
| 0.15000 | 25.3 | 0.8 | 13.3 | 38.6 | 14.1 | 66.0 | 56.0 | 27.4 | 41.9 | N | |
| 0.18045 | 19.5 | -1.1 | 13.3 | 32.8 | 12.2 | 64.5 | 54.5 | 31.7 | 42.3 | N | |
| 0.51720 | 3.8 | -1.8 | 13.3 | 17.1 | 11.5 | 56.0 | 46.0 | 38.9 | 34.5 | N | |
| 8.31240 | 18.7 | 18.6 | 14.0 | 32.7 | 32.6 | 60.0 | 50.0 | 27.3 | 17.4 | N | |
| 21.88410 | 8.0 | 2.2 | 14.7 | 22.7 | 16.9 | 60.0 | 50.0 | 37.3 | 33.1 | N | |
| 24.94350 | 25.0 | 21.7 | 14.8 | 39.8 | 36.5 | 60.0 | 50.0 | 20.2 | 13.5 | N | |
| 0.15000 | 25.3 | 0.7 | 13.3 | 38.6 | 14.0 | 66.0 | 56.0 | 27.4 | 42.0 | L | |
| 0.17415 | 20.0 | -0.7 | 13.3 | 33.3 | 12.6 | 64.8 | 54.8 | 31.5 | 42.2 | L | |
| 0.51320 | 4.1 | -1.2 | 13.3 | 17.4 | 12.1 | 56.0 | 46.0 | 38.6 | 33.9 | L | |
| 8.31288 | 18.4 | 18.3 | 14.0 | 32.4 | 32.3 | 60.0 | 50.0 | 27.6 | 17.7 | L | |
| 21.88380 | 9.4 | 3.4 | 14.7 | 24.1 | 18.1 | 60.0 | 50.0 | 35.9 | 31.9 | L | |
| 24.93844 | 27.6 | 25.5 | 14.8 | 42.4 | 40.3 | 60.0 | 50.0 | 17.6 | 9.7 | L | |

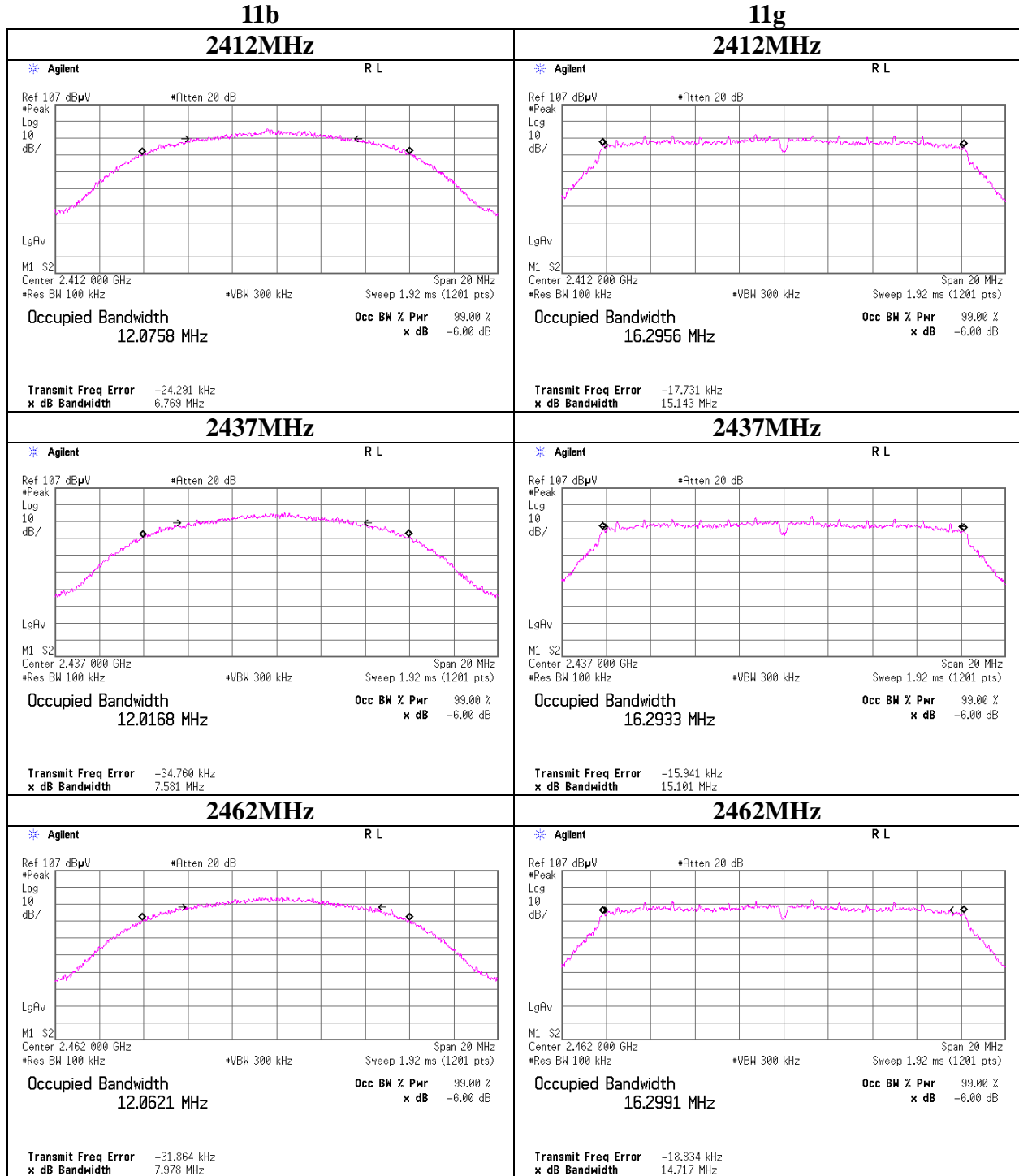
CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (PROBE LOSS + CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission
[DC3.4V]

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 32HE0238-HO-03 |
| Date | 05/18/2012 |
| Temperature/ Humidity | 24 deg. C / 53% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11n-20 Tx |

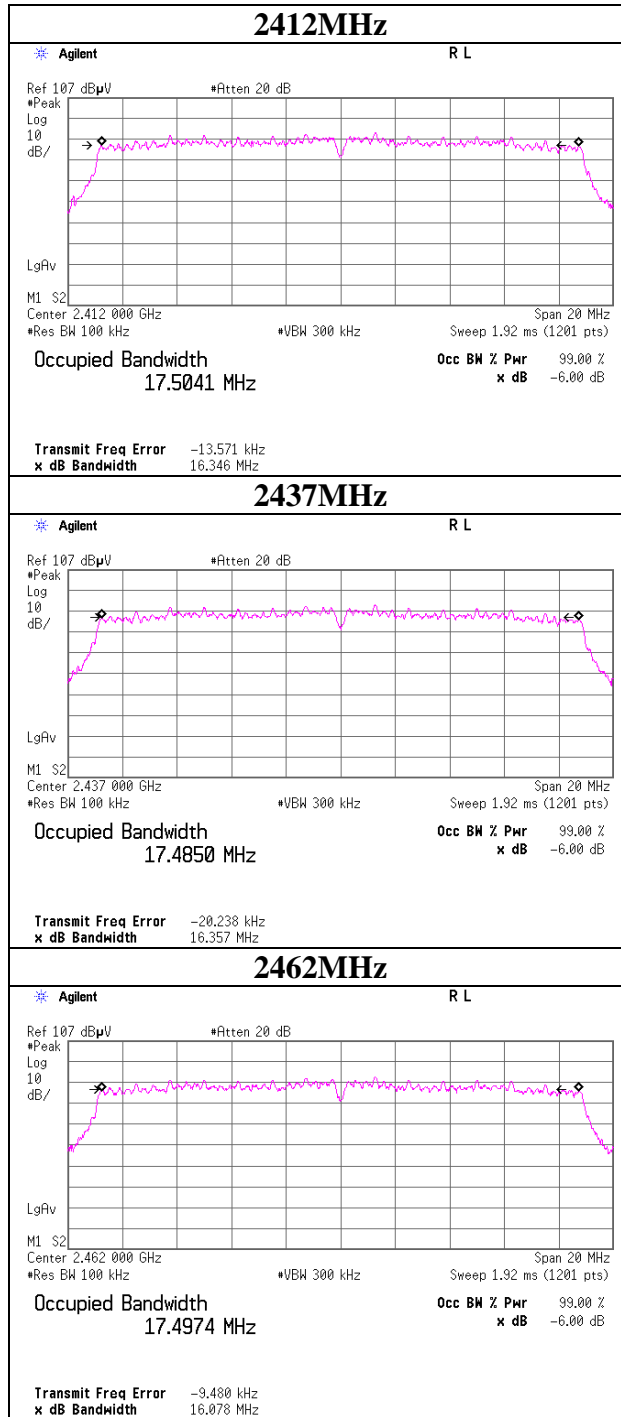


6dB Bandwidth



6dB Bandwidth

11n-20 Antenna



Maximum Peak Output Power

| | |
|-----------------------|--|
| Test place | Head Office EMC Lab. No.7 Measurement Room |
| Report No. | 32AH0238-HO-03 |
| Date | 05/16/2012 |
| Temperature/ Humidity | 22 deg. C / 45% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11b Tx |

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result | | Limit | | Margin [dB] |
|----------------|------------------|-----------------------|----------------|--------|------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | -3.68 | 1.33 | 9.96 | 7.61 | 5.77 | 30.00 | 1000 | 22.39 |
| 2437 | -4.12 | 1.33 | 9.96 | 7.17 | 5.21 | 30.00 | 1000 | 22.83 |
| 2462 | -4.16 | 1.34 | 9.96 | 7.14 | 5.18 | 30.00 | 1000 | 22.86 |

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

2437MHz

| Rate [Mbps] | Reading [dBm] | Remark |
|----------------|------------------|--------|
| 1 | -4.62 | |
| 2 | -4.31 | |
| 5.5 | -4.23 | |
| 11 | -4.12 | * |

*: Worst Rate

All comparizon were carried out on same frequency and measurement factors.

Maximum Peak Output Power

| | |
|-----------------------|--|
| Test place | Head Office EMC Lab. No.7 Measurement Room |
| Report No. | 32AH0238-HO-03 |
| Date | 05/16/2012 |
| Temperature/ Humidity | 22 deg. C / 45% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11g Tx |

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result | | Limit | | Margin [dB] |
|----------------|------------------|--------------------|----------------|--------|-------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | 3.94 | 1.33 | 9.96 | 15.23 | 33.34 | 30.00 | 1000 | 14.77 |
| 2437 | 3.58 | 1.33 | 9.96 | 14.87 | 30.69 | 30.00 | 1000 | 15.13 |
| 2462 | 3.17 | 1.34 | 9.96 | 14.47 | 27.99 | 30.00 | 1000 | 15.53 |

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

2437MHz

| Rate | Reading | Remark |
|--------|---------|--------|
| [Mbps] | [dBm] | |
| 6 | 3.58 | * |
| 9 | 1.97 | |
| 12 | 1.98 | |
| 18 | 1.89 | |
| 24 | 1.75 | |
| 36 | 2.28 | |
| 48 | 2.54 | |
| 54 | 2.09 | |

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

| | |
|-----------------------|--|
| Test place | Head Office EMC Lab. No.7 Measurement Room |
| Report No. | 32AH0238-HO-03 |
| Date | 05/16/2012 |
| Temperature/ Humidity | 22 deg. C / 45% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11n-20 Tx |

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result | | Limit | | Margin [dB] |
|----------------|------------------|-----------------------|----------------|--------|-------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | 3.97 | 1.33 | 9.96 | 15.26 | 33.57 | 30.00 | 1000 | 14.74 |
| 2437 | 3.34 | 1.33 | 9.96 | 14.63 | 29.04 | 30.00 | 1000 | 15.37 |
| 2462 | 2.01 | 1.34 | 9.96 | 13.31 | 21.43 | 30.00 | 1000 | 16.69 |

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

2437MHz

| MCS Number | Reading [dBm] | Remark |
|---------------|------------------|--------|
| 0 | 3.32 | |
| 1 | 3.05 | |
| 2 | 2.97 | |
| 3 | 3.30 | |
| 4 | 3.24 | |
| 5 | 3.32 | |
| 6 | 3.34 | * |
| 7 | 2.92 | |

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Average Output Power

| | |
|-----------------------|--|
| Test place | Head Office EMC Lab. No.7 Measurement Room |
| Report No. | 32AH0238-HO-03 |
| Date | 05/16/2012 |
| Temperature/ Humidity | 22 deg. C / 45% RH |
| Engineer | Hiroshi Kukita |
| Mode | 11b / 11g / 11n-20 Tx |

[AV]

11b **11Mbps**

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result | | Limit | | Margin [dB] |
|----------------|------------------|-----------------------|----------------|--------|------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | -7.07 | 1.33 | 9.96 | 4.22 | 2.64 | 30.00 | 1000 | 25.78 |
| 2437 | -7.38 | 1.33 | 9.96 | 3.91 | 2.46 | 30.00 | 1000 | 26.09 |
| 2462 | -7.58 | 1.34 | 9.96 | 3.72 | 2.36 | 30.00 | 1000 | 26.28 |

11g **6Mbps**

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result | | Limit | | Margin [dB] |
|----------------|------------------|-----------------------|----------------|--------|------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | -7.03 | 1.63 | 9.96 | 4.56 | 2.86 | 30.00 | 1000 | 25.44 |
| 2437 | -7.76 | 1.63 | 9.96 | 3.83 | 2.42 | 30.00 | 1000 | 26.17 |
| 2462 | -8.96 | 1.64 | 9.96 | 2.64 | 1.84 | 30.00 | 1000 | 27.36 |

11n-20 **MCS6**

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result | | Limit | | Margin [dB] |
|----------------|------------------|-----------------------|----------------|--------|------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | -7.64 | 1.63 | 9.96 | 3.95 | 2.48 | 30.00 | 1000 | 26.05 |
| 2437 | -7.63 | 1.63 | 9.96 | 3.96 | 2.49 | 30.00 | 1000 | 26.04 |
| 2462 | -9.59 | 1.64 | 9.96 | 2.01 | 1.59 | 30.00 | 1000 | 27.99 |

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32HE0238-HO-03
Date 05/17/2012 05/17/2012
Temperature/ Humidity 23 deg. C / 59% RH 23 deg. C / 59% RH
Engineer Hiroshi Kukita Takumi Shimada
 (1-10GHz) (10-26.5GHz,30-1000MHz)
Mode 11b Tx 2412MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 224.591 | QP | 34.0 | 17.0 | 9.0 | 32.0 | 28.0 | 46.0 | 18.0 | |
| Hori | 237.061 | QP | 31.7 | 17.1 | 9.1 | 32.0 | 25.9 | 46.0 | 20.1 | |
| Hori | 249.538 | QP | 33.9 | 17.2 | 9.2 | 32.0 | 28.3 | 46.0 | 17.7 | |
| Hori | 336.868 | QP | 33.8 | 16.7 | 9.9 | 32.0 | 28.4 | 46.0 | 17.6 | |
| Hori | 349.353 | QP | 34.5 | 16.9 | 9.9 | 32.0 | 29.3 | 46.0 | 16.7 | |
| Hori | 361.824 | QP | 30.2 | 17.1 | 10.0 | 32.0 | 25.3 | 46.0 | 20.7 | |
| Hori | 2390.000 | PK | 47.0 | 28.1 | 2.4 | 32.3 | 45.2 | 73.9 | 28.7 | |
| Hori | 2400.000 | PK | 53.0 | 28.1 | 2.4 | 32.3 | 51.2 | 73.9 | 22.7 | |
| Hori | 4824.000 | PK | 40.8 | 31.2 | 4.1 | 31.5 | 44.6 | 73.9 | 29.3 | |
| Hori | 7236.000 | PK | 42.5 | 35.6 | 4.9 | 32.5 | 50.5 | 73.9 | 23.4 | |
| Hori | 9648.000 | PK | 43.1 | 38.3 | 5.1 | 32.9 | 53.6 | 73.9 | 20.3 | |
| Hori | 24120.000 | PK | 46.5 | 38.7 | -1.1 | 32.1 | 52.0 | 73.9 | 21.9 | |
| Hori | 2390.000 | AV | 35.0 | 28.1 | 2.4 | 32.3 | 33.2 | 53.9 | 20.7 | |
| Hori | 2400.000 | AV | 41.0 | 28.1 | 2.4 | 32.3 | 39.2 | 53.9 | 14.7 | |
| Hori | 4824.000 | AV | 29.2 | 31.2 | 4.1 | 31.5 | 33.0 | 53.9 | 20.9 | |
| Hori | 7236.000 | AV | 30.5 | 35.6 | 4.9 | 32.5 | 38.5 | 53.9 | 15.4 | |
| Hori | 9648.000 | AV | 31.3 | 38.3 | 5.1 | 32.9 | 41.8 | 53.9 | 12.1 | |
| Hori | 24120.000 | AV | 34.1 | 38.7 | -1.1 | 32.1 | 39.6 | 53.9 | 14.3 | |
| Vert | 224.567 | QP | 32.3 | 17.0 | 9.0 | 32.0 | 26.3 | 46.0 | 19.7 | |
| Vert | 237.052 | QP | 33.0 | 17.1 | 9.1 | 32.0 | 27.2 | 46.0 | 18.8 | |
| Vert | 249.538 | QP | 33.6 | 17.2 | 9.2 | 32.0 | 28.0 | 46.0 | 18.0 | |
| Vert | 336.869 | QP | 37.0 | 16.7 | 9.9 | 32.0 | 31.6 | 46.0 | 14.4 | |
| Vert | 349.344 | QP | 37.9 | 16.9 | 9.9 | 32.0 | 32.7 | 46.0 | 13.3 | |
| Vert | 361.831 | QP | 37.5 | 17.1 | 10.0 | 32.0 | 32.6 | 46.0 | 13.4 | |
| Vert | 2390.000 | PK | 45.7 | 28.1 | 2.4 | 32.3 | 43.9 | 73.9 | 30.0 | |
| Vert | 2400.000 | PK | 51.0 | 28.1 | 2.4 | 32.3 | 49.2 | 73.9 | 24.7 | |
| Vert | 4824.000 | PK | 42.1 | 31.2 | 4.1 | 31.5 | 45.9 | 73.9 | 28.0 | |
| Vert | 7236.000 | PK | 42.5 | 35.6 | 4.4 | 32.5 | 50.0 | 73.9 | 23.9 | |
| Vert | 9648.000 | PK | 43.3 | 38.3 | 5.1 | 32.9 | 53.8 | 73.9 | 20.1 | |
| Vert | 24120.000 | PK | 47.1 | 38.7 | -1.1 | 32.1 | 52.6 | 73.9 | 21.3 | |
| Vert | 2390.000 | AV | 33.5 | 28.1 | 2.4 | 32.3 | 31.7 | 53.9 | 22.2 | |
| Vert | 2400.000 | AV | 40.4 | 28.1 | 2.4 | 32.3 | 38.6 | 53.9 | 15.3 | |
| Vert | 4824.000 | AV | 29.5 | 31.2 | 4.1 | 31.5 | 33.3 | 53.9 | 20.6 | |
| Vert | 7236.000 | AV | 30.5 | 35.6 | 4.4 | 32.5 | 38.0 | 53.9 | 15.9 | |
| Vert | 9648.000 | AV | 31.3 | 38.3 | 5.8 | 32.9 | 42.5 | 53.9 | 11.4 | |
| Vert | 24120.000 | AV | 34.2 | 38.7 | -1.1 | 32.1 | 39.7 | 53.9 | 14.2 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 32HE0238-HO-03 |
| Date | 05/17/2012 |
| Temperature/ Humidity | 23 deg. C / 59% RH |
| Engineer | Takumi Shimada |
| Mode | 11b Tx 2437MHz |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|--------|
| Hori | 224.593 | QP | 33.9 | 17.0 | 9.0 | 32.0 | 27.9 | 46.0 | 18.1 | |
| Hori | 237.057 | QP | 31.5 | 17.1 | 9.1 | 32.0 | 25.7 | 46.0 | 20.3 | |
| Hori | 249.533 | QP | 33.8 | 17.2 | 9.2 | 32.0 | 28.2 | 46.0 | 17.8 | |
| Hori | 336.872 | QP | 34.0 | 16.7 | 9.9 | 32.0 | 28.6 | 46.0 | 17.4 | |
| Hori | 349.350 | QP | 34.2 | 16.9 | 9.9 | 32.0 | 29.0 | 46.0 | 17.0 | |
| Hori | 361.829 | QP | 30.6 | 17.1 | 10.0 | 32.0 | 25.7 | 46.0 | 20.3 | |
| Hori | 4874.000 | PK | 42.1 | 31.4 | 4.2 | 31.5 | 46.2 | 73.9 | 27.7 | |
| Hori | 7311.000 | PK | 42.2 | 35.7 | 4.9 | 32.5 | 50.3 | 73.9 | 23.6 | |
| Hori | 9748.000 | PK | 42.8 | 38.4 | 5.9 | 32.9 | 54.2 | 73.9 | 19.7 | |
| Hori | 24370.000 | PK | 46.1 | 38.6 | -1.1 | 32.1 | 51.5 | 73.9 | 22.4 | |
| Hori | 4874.000 | AV | 30.1 | 31.4 | 4.2 | 31.5 | 34.2 | 53.9 | 19.7 | |
| Hori | 7311.000 | AV | 30.9 | 35.7 | 4.9 | 32.5 | 39.0 | 53.9 | 14.9 | |
| Hori | 9748.000 | AV | 30.9 | 38.4 | 5.9 | 32.9 | 42.3 | 53.9 | 11.6 | |
| Hori | 24370.000 | AV | 34.4 | 38.6 | -1.1 | 32.1 | 39.8 | 53.9 | 14.1 | |
| Vert | 224.578 | QP | 32.6 | 17.0 | 9.0 | 32.0 | 26.6 | 46.0 | 19.4 | |
| Vert | 237.059 | QP | 32.2 | 17.1 | 9.1 | 32.0 | 26.4 | 46.0 | 19.6 | |
| Vert | 249.534 | QP | 33.4 | 17.2 | 9.2 | 32.0 | 27.8 | 46.0 | 18.2 | |
| Vert | 336.870 | QP | 36.2 | 16.7 | 9.9 | 32.0 | 30.8 | 46.0 | 15.2 | |
| Vert | 349.342 | QP | 37.5 | 16.9 | 9.9 | 32.0 | 32.3 | 46.0 | 13.7 | |
| Vert | 361.829 | QP | 37.4 | 17.1 | 10.0 | 32.0 | 32.5 | 46.0 | 13.5 | |
| Vert | 4874.000 | PK | 42.3 | 31.4 | 4.2 | 31.5 | 46.4 | 73.9 | 27.5 | |
| Vert | 7311.000 | PK | 42.5 | 35.7 | 4.9 | 32.5 | 50.6 | 73.9 | 23.3 | |
| Vert | 9748.000 | PK | 42.3 | 38.4 | 5.9 | 32.9 | 53.7 | 73.9 | 20.2 | |
| Vert | 24370.000 | PK | 46.4 | 38.6 | -1.1 | 32.1 | 51.8 | 73.9 | 22.1 | |
| Vert | 4874.000 | AV | 30.2 | 31.4 | 4.2 | 31.5 | 34.3 | 53.9 | 19.6 | |
| Vert | 7311.000 | AV | 31.1 | 35.7 | 4.9 | 32.5 | 39.2 | 53.9 | 14.7 | |
| Vert | 9748.000 | AV | 31.4 | 38.4 | 5.9 | 32.9 | 42.8 | 53.9 | 11.1 | |
| Vert | 24370.000 | AV | 34.5 | 38.6 | -1.1 | 32.1 | 39.9 | 53.9 | 14.0 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32HE0238-HO-03
Date 05/17/2012 05/17/2012
Temperature/ Humidity 23 deg. C / 59% RH 23 deg. C / 59% RH
Engineer Hiroshi Kukita Takumi Shimada
(1-10GHz) (10-26.5GHz,30-1000MHz)
Mode 11b Tx 2462MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 224.588 | QP | 34.4 | 17.0 | 9.0 | 32.0 | 28.4 | 46.0 | 17.6 | |
| Hori | 237.059 | QP | 32.0 | 17.1 | 9.1 | 32.0 | 26.2 | 46.0 | 19.8 | |
| Hori | 249.535 | QP | 34.1 | 17.2 | 9.2 | 32.0 | 28.5 | 46.0 | 17.5 | |
| Hori | 336.870 | QP | 34.0 | 16.7 | 9.9 | 32.0 | 28.6 | 46.0 | 17.4 | |
| Hori | 349.352 | QP | 34.4 | 16.9 | 9.9 | 32.0 | 29.2 | 46.0 | 16.8 | |
| Hori | 361.833 | QP | 30.5 | 17.1 | 10.0 | 32.0 | 25.6 | 46.0 | 20.4 | |
| Hori | 2483.500 | PK | 47.7 | 28.5 | 2.4 | 32.2 | 46.4 | 73.9 | 27.5 | |
| Hori | 4924.000 | PK | 41.9 | 31.5 | 4.2 | 31.5 | 46.1 | 73.9 | 27.8 | |
| Hori | 7386.000 | PK | 43.0 | 35.8 | 5.0 | 32.6 | 51.2 | 73.9 | 22.7 | |
| Hori | 9848.000 | PK | 43.2 | 38.5 | 5.9 | 33.0 | 54.6 | 73.9 | 19.3 | |
| Hori | 24620.000 | PK | 46.4 | 38.6 | -1.0 | 32.2 | 51.8 | 73.9 | 22.1 | |
| Hori | 2483.500 | AV | 34.5 | 28.5 | 2.4 | 32.2 | 33.2 | 53.9 | 20.7 | |
| Hori | 4924.000 | AV | 29.8 | 31.5 | 4.2 | 31.5 | 34.0 | 53.9 | 19.9 | |
| Hori | 7386.000 | AV | 30.2 | 35.8 | 5.0 | 32.6 | 38.4 | 53.9 | 15.5 | |
| Hori | 9848.000 | AV | 31.3 | 38.5 | 5.9 | 33.0 | 42.7 | 53.9 | 11.2 | |
| Hori | 24620.000 | AV | 34.4 | 38.6 | -1.0 | 32.2 | 39.8 | 53.9 | 14.1 | |
| Vert | 224.581 | QP | 32.1 | 17.0 | 9.0 | 32.0 | 26.1 | 46.0 | 19.9 | |
| Vert | 237.057 | QP | 33.2 | 17.1 | 9.1 | 32.0 | 27.4 | 46.0 | 18.6 | |
| Vert | 249.538 | QP | 33.3 | 17.2 | 9.2 | 32.0 | 27.7 | 46.0 | 18.3 | |
| Vert | 336.871 | QP | 36.6 | 16.7 | 9.9 | 32.0 | 31.2 | 46.0 | 14.8 | |
| Vert | 349.347 | QP | 38.1 | 16.9 | 9.9 | 32.0 | 32.9 | 46.0 | 13.1 | |
| Vert | 361.831 | QP | 37.2 | 17.1 | 10.0 | 32.0 | 32.3 | 46.0 | 13.7 | |
| Vert | 2483.500 | PK | 45.3 | 28.5 | 2.4 | 32.2 | 44.0 | 73.9 | 29.9 | |
| Vert | 4924.000 | PK | 41.8 | 31.5 | 4.2 | 31.5 | 46.0 | 73.9 | 27.9 | |
| Vert | 7386.000 | PK | 42.5 | 35.8 | 5.0 | 32.6 | 50.7 | 73.9 | 23.2 | |
| Vert | 9848.000 | PK | 43.6 | 38.5 | 5.9 | 33.0 | 55.0 | 73.9 | 18.9 | |
| Vert | 24620.000 | PK | 47.1 | 38.6 | -1.0 | 32.2 | 52.5 | 73.9 | 21.4 | |
| Vert | 2483.500 | AV | 33.0 | 28.5 | 2.4 | 32.2 | 31.7 | 53.9 | 22.2 | |
| Vert | 4924.000 | AV | 28.4 | 31.5 | 4.2 | 31.5 | 32.6 | 53.9 | 21.3 | |
| Vert | 7386.000 | AV | 30.3 | 35.8 | 5.0 | 32.6 | 38.5 | 53.9 | 15.4 | |
| Vert | 9848.000 | AV | 31.3 | 38.5 | 5.9 | 33.0 | 42.7 | 53.9 | 11.2 | |
| Vert | 24620.000 | AV | 34.4 | 38.6 | -1.0 | 32.2 | 39.8 | 53.9 | 14.1 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32HE0238-HO-03
Date 05/17/2012 05/17/2012
Temperature/ Humidity 23 deg. C / 59% RH 23 deg. C / 59% RH
Engineer Hiroshi Kukita Takumi Shimada
(1-10GHz) (10-26.5GHz,30-1000MHz)
Mode 11g Tx 2412MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 224.582 | QP | 34.7 | 17.0 | 9.0 | 32.0 | 28.7 | 46.0 | 17.3 | |
| Hori | 237.061 | QP | 31.6 | 17.1 | 9.1 | 32.0 | 25.8 | 46.0 | 20.2 | |
| Hori | 249.532 | QP | 34.4 | 17.2 | 9.2 | 32.0 | 28.8 | 46.0 | 17.2 | |
| Hori | 336.866 | QP | 33.7 | 16.7 | 9.9 | 32.0 | 28.3 | 46.0 | 17.7 | |
| Hori | 349.349 | QP | 34.2 | 16.9 | 9.9 | 32.0 | 29.0 | 46.0 | 17.0 | |
| Hori | 361.833 | QP | 31.0 | 17.1 | 10.0 | 32.0 | 26.1 | 46.0 | 19.9 | |
| Hori | 2390.000 | PK | 52.5 | 28.1 | 2.4 | 32.3 | 50.7 | 73.9 | 23.2 | |
| Hori | 2400.000 | PK | 63.4 | 28.1 | 2.4 | 32.3 | 61.6 | 73.9 | 12.3 | |
| Hori | 4824.000 | PK | 40.5 | 31.2 | 4.1 | 31.5 | 44.3 | 73.9 | 29.6 | |
| Hori | 7236.000 | PK | 42.3 | 35.6 | 4.9 | 32.5 | 50.3 | 73.9 | 23.6 | |
| Hori | 9648.000 | PK | 43.4 | 38.3 | 5.8 | 32.9 | 54.6 | 73.9 | 19.3 | |
| Hori | 24120.000 | PK | 46.7 | 38.7 | -1.1 | 32.1 | 52.2 | 73.9 | 21.7 | |
| Hori | 2390.000 | AV | 41.6 | 28.1 | 2.4 | 32.3 | 39.8 | 53.9 | 14.1 | |
| Hori | 2400.000 | AV | 48.6 | 28.1 | 2.4 | 32.3 | 46.8 | 53.9 | 7.1 | |
| Hori | 4824.000 | AV | 29.4 | 31.2 | 4.1 | 31.5 | 33.2 | 53.9 | 20.7 | |
| Hori | 7236.000 | AV | 30.3 | 35.6 | 4.9 | 32.5 | 38.3 | 53.9 | 15.6 | |
| Hori | 9648.000 | AV | 31.2 | 38.3 | 5.8 | 32.9 | 42.4 | 53.9 | 11.5 | |
| Hori | 24120.000 | AV | 34.1 | 38.7 | -1.1 | 32.1 | 39.6 | 53.9 | 14.3 | |
| Vert | 224.576 | QP | 32.3 | 17.0 | 9.0 | 32.0 | 26.3 | 46.0 | 19.7 | |
| Vert | 237.053 | QP | 33.1 | 17.1 | 9.1 | 32.0 | 27.3 | 46.0 | 18.7 | |
| Vert | 249.533 | QP | 33.5 | 17.2 | 9.2 | 32.0 | 27.9 | 46.0 | 18.1 | |
| Vert | 336.869 | QP | 36.5 | 16.7 | 9.9 | 32.0 | 31.1 | 46.0 | 14.9 | |
| Vert | 349.351 | QP | 37.5 | 16.9 | 9.9 | 32.0 | 32.3 | 46.0 | 13.7 | |
| Vert | 361.833 | QP | 37.4 | 17.1 | 10.0 | 32.0 | 32.5 | 46.0 | 13.5 | |
| Vert | 2390.000 | PK | 50.0 | 28.1 | 2.4 | 32.3 | 48.2 | 73.9 | 25.7 | |
| Vert | 2400.000 | PK | 64.3 | 28.1 | 2.4 | 32.3 | 62.5 | 73.9 | 11.4 | |
| Vert | 4824.000 | PK | 41.8 | 31.2 | 4.1 | 31.5 | 45.6 | 73.9 | 28.3 | |
| Vert | 7236.000 | PK | 43.3 | 35.6 | 4.9 | 32.5 | 51.3 | 73.9 | 22.6 | |
| Vert | 9648.000 | PK | 44.1 | 38.3 | 5.8 | 32.9 | 55.3 | 73.9 | 18.6 | |
| Vert | 24120.000 | PK | 46.6 | 38.7 | -1.1 | 32.1 | 52.1 | 73.9 | 21.8 | |
| Vert | 2390.000 | AV | 37.4 | 28.1 | 2.4 | 32.3 | 35.6 | 53.9 | 18.3 | |
| Vert | 2400.000 | AV | 46.3 | 28.1 | 2.4 | 32.3 | 44.5 | 53.9 | 9.4 | |
| Vert | 4824.000 | AV | 28.9 | 31.2 | 4.1 | 31.5 | 32.7 | 53.9 | 21.2 | |
| Vert | 7236.000 | AV | 30.5 | 35.6 | 4.9 | 32.5 | 38.5 | 53.9 | 15.4 | |
| Vert | 9648.000 | AV | 31.3 | 38.3 | 5.8 | 32.9 | 42.5 | 53.9 | 11.4 | |
| Vert | 24120.000 | AV | 34.2 | 38.7 | -1.1 | 32.1 | 39.7 | 53.9 | 14.2 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32HE0238-HO-03
Date 05/17/2012 05/17/2012
Temperature/ Humidity 23 deg. C / 59% RH 23 deg. C / 59% RH
Engineer Hiroshi Kukita Takumi Shimada
(1-10GHz) (10-26.5GHz,30-1000MHz)
Mode 11g Tx 2462MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 224.589 | QP | 33.8 | 17.0 | 9.0 | 32.0 | 27.8 | 46.0 | 18.2 | |
| Hori | 237.058 | QP | 31.9 | 17.1 | 9.1 | 32.0 | 26.1 | 46.0 | 19.9 | |
| Hori | 249.532 | QP | 34.4 | 17.2 | 9.2 | 32.0 | 28.8 | 46.0 | 17.2 | |
| Hori | 336.871 | QP | 33.3 | 16.7 | 9.9 | 32.0 | 27.9 | 46.0 | 18.1 | |
| Hori | 349.349 | QP | 34.1 | 16.9 | 9.9 | 32.0 | 28.9 | 46.0 | 17.1 | |
| Hori | 361.829 | QP | 31.2 | 17.1 | 10.0 | 32.0 | 26.3 | 46.0 | 19.7 | |
| Hori | 2483.500 | PK | 52.9 | 28.5 | 2.4 | 32.2 | 51.6 | 73.9 | 22.3 | |
| Hori | 4924.000 | PK | 41.4 | 31.5 | 4.2 | 31.5 | 45.6 | 73.9 | 28.3 | |
| Hori | 7386.000 | PK | 42.1 | 35.8 | 5.0 | 32.6 | 50.3 | 73.9 | 23.6 | |
| Hori | 9848.000 | PK | 42.8 | 38.5 | 5.9 | 33.0 | 54.2 | 73.9 | 19.7 | |
| Hori | 24620.000 | PK | 46.8 | 38.6 | -1.0 | 32.2 | 52.2 | 73.9 | 21.7 | |
| Hori | 2483.500 | AV | 41.0 | 28.5 | 2.4 | 32.2 | 39.7 | 53.9 | 14.2 | |
| Hori | 4924.000 | AV | 28.8 | 31.5 | 4.2 | 31.5 | 33.0 | 53.9 | 20.9 | |
| Hori | 7386.000 | AV | 30.2 | 35.8 | 5.0 | 32.6 | 38.4 | 53.9 | 15.5 | |
| Hori | 9848.000 | AV | 31.0 | 38.5 | 5.9 | 33.0 | 42.4 | 53.9 | 11.5 | |
| Hori | 24620.000 | AV | 34.4 | 38.6 | -1.0 | 32.2 | 39.8 | 53.9 | 14.1 | |
| Vert | 224.582 | QP | 32.1 | 17.0 | 9.0 | 32.0 | 26.1 | 46.0 | 19.9 | |
| Vert | 237.052 | QP | 33.1 | 17.1 | 9.1 | 32.0 | 27.3 | 46.0 | 18.7 | |
| Vert | 249.531 | QP | 33.3 | 17.2 | 9.2 | 32.0 | 27.7 | 46.0 | 18.3 | |
| Vert | 336.869 | QP | 37.7 | 16.7 | 9.9 | 32.0 | 32.3 | 46.0 | 13.7 | |
| Vert | 349.353 | QP | 36.2 | 16.9 | 9.9 | 32.0 | 31.0 | 46.0 | 15.0 | |
| Vert | 361.831 | QP | 36.6 | 17.1 | 10.0 | 32.0 | 31.7 | 46.0 | 14.3 | |
| Vert | 2483.500 | PK | 50.9 | 28.5 | 2.4 | 32.2 | 49.6 | 73.9 | 24.3 | |
| Vert | 4924.000 | PK | 41.8 | 31.5 | 4.2 | 31.5 | 46.0 | 73.9 | 27.9 | |
| Vert | 7386.000 | PK | 42.6 | 35.8 | 5.0 | 32.6 | 50.8 | 73.9 | 23.1 | |
| Vert | 9848.000 | PK | 43.3 | 38.5 | 5.9 | 33.0 | 54.7 | 73.9 | 19.2 | |
| Vert | 24620.000 | PK | 47.0 | 38.6 | -1.0 | 32.2 | 52.4 | 73.9 | 21.5 | |
| Vert | 2483.500 | AV | 39.5 | 28.5 | 2.4 | 32.2 | 38.2 | 53.9 | 15.7 | |
| Vert | 4924.000 | AV | 28.9 | 31.5 | 4.2 | 31.5 | 33.1 | 53.9 | 20.8 | |
| Vert | 7386.000 | AV | 30.3 | 35.8 | 5.0 | 32.6 | 38.5 | 53.9 | 15.4 | |
| Vert | 9848.000 | AV | 31.3 | 38.5 | 5.9 | 33.0 | 42.7 | 53.9 | 11.2 | |
| Vert | 24620.000 | AV | 34.4 | 38.6 | -1.0 | 32.2 | 39.8 | 53.9 | 14.1 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Report No. 32HE0238-HO-03
 Date 05/17/2012 05/18/2012
 Temperature/ Humidity 23 deg. C / 59% RH 24 deg. C / 53% RH
 Engineer Takumi Shimada Hiroshi Kukita
 (1-26.5GHz) (30-1000MHz)
 Mode 1 In Tx 2412MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 224.583 | QP | 33.9 | 17.0 | 9.0 | 32.0 | 27.9 | 46.0 | 18.1 | |
| Hori | 237.061 | QP | 31.3 | 17.1 | 9.1 | 32.0 | 25.5 | 46.0 | 20.5 | |
| Hori | 249.532 | QP | 35.5 | 17.2 | 9.2 | 32.0 | 29.9 | 46.0 | 16.1 | |
| Hori | 336.874 | QP | 35.3 | 16.7 | 9.9 | 32.0 | 29.9 | 46.0 | 16.1 | |
| Hori | 349.353 | QP | 35.1 | 16.9 | 9.9 | 32.0 | 29.9 | 46.0 | 16.1 | |
| Hori | 361.828 | QP | 32.8 | 17.1 | 10.0 | 32.0 | 27.9 | 46.0 | 18.1 | |
| Hori | 2390.000 | PK | 54.4 | 28.1 | 2.4 | 32.3 | 52.6 | 73.9 | 21.3 | |
| Hori | 2400.000 | PK | 70.0 | 28.1 | 2.4 | 32.3 | 68.2 | 73.9 | 5.7 | |
| Hori | 4824.000 | PK | 41.8 | 31.2 | 4.1 | 31.5 | 45.6 | 73.9 | 28.3 | |
| Hori | 7236.000 | PK | 43.1 | 35.6 | 4.9 | 32.5 | 51.1 | 73.9 | 22.8 | |
| Hori | 9648.000 | PK | 43.9 | 38.3 | 5.8 | 32.9 | 55.1 | 73.9 | 18.8 | |
| Hori | 24120.000 | PK | 46.5 | 38.7 | -1.1 | 32.1 | 52.0 | 73.9 | 21.9 | |
| Hori | 2390.000 | AV | 41.4 | 28.1 | 2.4 | 32.3 | 39.6 | 53.9 | 14.3 | |
| Hori | 2400.000 | AV | 48.8 | 28.1 | 2.4 | 32.3 | 47.0 | 53.9 | 6.9 | |
| Hori | 4824.000 | AV | 29.3 | 31.2 | 4.1 | 31.5 | 33.1 | 53.9 | 20.8 | |
| Hori | 7236.000 | AV | 30.3 | 35.6 | 4.9 | 32.5 | 38.3 | 53.9 | 15.6 | |
| Hori | 9648.000 | AV | 31.3 | 38.3 | 5.8 | 32.9 | 42.5 | 53.9 | 11.4 | |
| Hori | 24120.000 | AV | 34.2 | 38.7 | -1.1 | 32.1 | 39.7 | 53.9 | 14.2 | |
| Vert | 224.580 | QP | 33.0 | 17.0 | 9.0 | 32.0 | 27.0 | 46.0 | 19.0 | |
| Vert | 237.062 | QP | 33.9 | 17.1 | 9.1 | 32.0 | 28.1 | 46.0 | 17.9 | |
| Vert | 249.538 | QP | 35.4 | 17.2 | 9.2 | 32.0 | 29.8 | 46.0 | 16.2 | |
| Vert | 336.873 | QP | 38.1 | 16.7 | 9.9 | 32.0 | 32.7 | 46.0 | 13.3 | |
| Vert | 349.352 | QP | 36.6 | 16.9 | 9.9 | 32.0 | 31.4 | 46.0 | 14.6 | |
| Vert | 361.830 | QP | 36.0 | 17.1 | 10.0 | 32.0 | 31.1 | 46.0 | 14.9 | |
| Vert | 2390.000 | PK | 51.6 | 28.1 | 2.4 | 32.3 | 49.8 | 73.9 | 24.1 | |
| Vert | 2400.000 | PK | 67.3 | 28.1 | 2.4 | 32.3 | 65.5 | 73.9 | 8.4 | |
| Vert | 4824.000 | PK | 40.6 | 31.2 | 4.1 | 31.5 | 44.4 | 73.9 | 29.5 | |
| Vert | 7236.000 | PK | 42.4 | 35.6 | 4.9 | 32.5 | 50.4 | 73.9 | 23.5 | |
| Vert | 9648.000 | PK | 44.0 | 38.3 | 5.8 | 32.9 | 55.2 | 73.9 | 18.7 | |
| Vert | 24120.000 | PK | 47.0 | 38.7 | -1.1 | 32.1 | 52.5 | 73.9 | 21.4 | |
| Vert | 2390.000 | AV | 38.9 | 28.1 | 2.4 | 32.3 | 37.1 | 53.9 | 16.8 | |
| Vert | 2400.000 | AV | 46.3 | 28.1 | 2.4 | 32.3 | 44.5 | 53.9 | 9.4 | |
| Vert | 4824.000 | AV | 29.2 | 31.2 | 4.1 | 31.5 | 33.0 | 53.9 | 20.9 | |
| Vert | 7236.000 | AV | 30.4 | 35.6 | 4.9 | 32.5 | 38.4 | 53.9 | 15.5 | |
| Vert | 9648.000 | AV | 31.4 | 38.3 | 5.8 | 32.9 | 42.6 | 53.9 | 11.3 | |
| Vert | 24120.000 | AV | 34.2 | 38.7 | -1.1 | 32.1 | 39.7 | 53.9 | 14.2 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32HE0238-HO-03
Date 05/17/2012 05/18/2012
Temperature/ Humidity 23 deg. C / 59% RH 24 deg. C / 53% RH
Engineer Takumi Shimada Hiroshi Kukita
(1-26.5GHz) (30-1000MHz)
Mode 1 In Tx 2437MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 224.591 | QP | 34.3 | 17.0 | 9.0 | 32.0 | 28.3 | 46.0 | 17.7 | |
| Hori | 237.050 | QP | 32.3 | 17.1 | 9.1 | 32.0 | 26.5 | 46.0 | 19.5 | |
| Hori | 249.532 | QP | 34.1 | 17.2 | 9.2 | 32.0 | 28.5 | 46.0 | 17.5 | |
| Hori | 336.876 | QP | 34.0 | 16.7 | 9.9 | 32.0 | 28.6 | 46.0 | 17.4 | |
| Hori | 349.341 | QP | 33.4 | 16.9 | 9.9 | 32.0 | 28.2 | 46.0 | 17.8 | |
| Hori | 361.820 | QP | 31.0 | 17.1 | 10.0 | 32.0 | 26.1 | 46.0 | 19.9 | |
| Hori | 4874.000 | PK | 42.0 | 31.4 | 4.2 | 31.5 | 46.1 | 73.9 | 27.8 | |
| Hori | 7311.000 | PK | 42.7 | 35.7 | 4.9 | 32.5 | 50.8 | 73.9 | 23.1 | |
| Hori | 9748.000 | PK | 43.0 | 38.4 | 5.9 | 32.9 | 54.4 | 73.9 | 19.5 | |
| Hori | 24370.000 | PK | 46.4 | 38.6 | -1.1 | 32.1 | 51.8 | 73.9 | 22.1 | |
| Hori | 4874.000 | AV | 29.3 | 31.4 | 4.2 | 31.5 | 33.4 | 53.9 | 20.5 | |
| Hori | 7311.000 | AV | 30.2 | 35.7 | 4.9 | 32.5 | 38.3 | 53.9 | 15.6 | |
| Hori | 9748.000 | AV | 30.6 | 38.4 | 5.9 | 32.9 | 42.0 | 53.9 | 11.9 | |
| Hori | 24370.000 | AV | 34.3 | 38.6 | -1.1 | 32.1 | 39.7 | 53.9 | 14.2 | |
| Vert | 224.581 | QP | 32.0 | 17.0 | 9.0 | 32.0 | 26.0 | 46.0 | 20.0 | |
| Vert | 237.050 | QP | 33.1 | 17.1 | 9.1 | 32.0 | 27.3 | 46.0 | 18.7 | |
| Vert | 249.534 | QP | 34.0 | 17.2 | 9.2 | 32.0 | 28.4 | 46.0 | 17.6 | |
| Vert | 336.872 | QP | 38.0 | 16.7 | 9.9 | 32.0 | 32.6 | 46.0 | 13.4 | |
| Vert | 349.355 | QP | 36.7 | 16.9 | 9.9 | 32.0 | 31.5 | 46.0 | 14.5 | |
| Vert | 361.832 | QP | 36.0 | 17.1 | 10.0 | 32.0 | 31.1 | 46.0 | 14.9 | |
| Vert | 4874.000 | PK | 41.7 | 31.4 | 4.2 | 31.5 | 45.8 | 73.9 | 28.1 | |
| Vert | 7311.000 | PK | 42.5 | 35.7 | 4.9 | 32.5 | 50.6 | 73.9 | 23.3 | |
| Vert | 9748.000 | PK | 42.7 | 38.4 | 5.9 | 32.9 | 54.1 | 73.9 | 19.8 | |
| Vert | 24370.000 | PK | 46.5 | 38.6 | -1.1 | 32.1 | 51.9 | 73.9 | 22.0 | |
| Vert | 4874.000 | AV | 30.5 | 31.4 | 4.2 | 31.5 | 34.6 | 53.9 | 19.3 | |
| Vert | 7311.000 | AV | 31.7 | 35.7 | 4.9 | 32.5 | 39.8 | 53.9 | 14.1 | |
| Vert | 9748.000 | AV | 32.2 | 38.4 | 5.9 | 32.9 | 43.6 | 53.9 | 10.3 | |
| Vert | 24370.000 | AV | 34.4 | 38.6 | -1.1 | 32.1 | 39.8 | 53.9 | 14.1 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

| | | |
|-----------------------|---|--------------------|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber | |
| Report No. | 32HE0238-HO-03 | |
| Date | 05/17/2012 | 05/18/2012 |
| Temperature/ Humidity | 23 deg. C / 59% RH | 24 deg. C / 53% RH |
| Engineer | Takumi Shimada | Hiroshi Kukita |
| | (1-26.5GHz) | (30-1000MHz) |
| Mode | 1 In Tx 2462MHz | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|--------|
| Hori | 224.591 | QP | 32.4 | 17.0 | 9.0 | 32.0 | 26.4 | 46.0 | 19.6 | |
| Hori | 237.063 | QP | 33.0 | 17.1 | 9.1 | 32.0 | 27.2 | 46.0 | 18.8 | |
| Hori | 249.530 | QP | 34.7 | 17.2 | 9.2 | 32.0 | 29.1 | 46.0 | 16.9 | |
| Hori | 336.874 | QP | 32.7 | 16.7 | 9.9 | 32.0 | 27.3 | 46.0 | 18.7 | |
| Hori | 349.352 | QP | 34.7 | 16.9 | 9.9 | 32.0 | 29.5 | 46.0 | 16.5 | |
| Hori | 361.825 | QP | 31.3 | 17.1 | 10.0 | 32.0 | 26.4 | 46.0 | 19.6 | |
| Hori | 2483.500 | PK | 53.7 | 28.5 | 2.4 | 32.2 | 52.4 | 73.9 | 21.5 | |
| Hori | 4924.000 | PK | 41.5 | 31.5 | 4.2 | 31.5 | 45.7 | 73.9 | 28.2 | |
| Hori | 7386.000 | PK | 42.4 | 35.8 | 5.0 | 32.6 | 50.6 | 73.9 | 23.3 | |
| Hori | 9848.000 | PK | 43.5 | 38.5 | 5.9 | 33.0 | 54.9 | 73.9 | 19.0 | |
| Hori | 24620.000 | PK | 46.6 | 38.6 | -1.0 | 32.2 | 52.0 | 73.9 | 21.9 | |
| Hori | 2483.500 | AV | 41.0 | 28.5 | 2.4 | 32.2 | 39.7 | 53.9 | 14.2 | |
| Hori | 4924.000 | AV | 29.1 | 31.5 | 4.2 | 31.5 | 33.3 | 53.9 | 20.6 | |
| Hori | 7386.000 | AV | 30.2 | 35.8 | 5.0 | 32.6 | 38.4 | 53.9 | 15.5 | |
| Hori | 9848.000 | AV | 31.2 | 38.5 | 5.9 | 33.0 | 42.6 | 53.9 | 11.3 | |
| Hori | 24620.000 | AV | 34.4 | 38.6 | -1.0 | 32.2 | 39.8 | 53.9 | 14.1 | |
| Vert | 224.580 | QP | 34.2 | 17.0 | 9.0 | 32.0 | 28.2 | 46.0 | 17.8 | |
| Vert | 237.056 | QP | 32.3 | 17.1 | 9.1 | 32.0 | 26.5 | 46.0 | 19.5 | |
| Vert | 249.535 | QP | 35.7 | 17.2 | 9.2 | 32.0 | 30.1 | 46.0 | 15.9 | |
| Vert | 336.861 | QP | 33.9 | 16.7 | 9.9 | 32.0 | 28.5 | 46.0 | 17.5 | |
| Vert | 349.348 | QP | 33.8 | 16.9 | 9.9 | 32.0 | 28.6 | 46.0 | 17.4 | |
| Vert | 361.835 | QP | 32.0 | 17.1 | 10.0 | 32.0 | 27.1 | 46.0 | 18.9 | |
| Vert | 2483.500 | PK | 53.9 | 28.5 | 2.4 | 32.2 | 52.6 | 73.9 | 21.3 | |
| Vert | 4924.000 | PK | 41.7 | 31.5 | 4.2 | 31.5 | 45.9 | 73.9 | 28.0 | |
| Vert | 7386.000 | PK | 43.1 | 35.8 | 5.0 | 32.6 | 51.3 | 73.9 | 22.6 | |
| Vert | 9848.000 | PK | 43.4 | 38.5 | 5.9 | 33.0 | 54.8 | 73.9 | 19.1 | |
| Vert | 24620.000 | PK | 47.1 | 38.6 | -1.0 | 32.2 | 52.5 | 73.9 | 21.4 | |
| Vert | 2483.500 | AV | 40.3 | 28.5 | 2.4 | 32.2 | 39.0 | 53.9 | 14.9 | |
| Vert | 4924.000 | AV | 29.0 | 31.5 | 4.2 | 31.5 | 33.2 | 53.9 | 20.7 | |
| Vert | 7386.000 | AV | 30.2 | 35.8 | 5.0 | 32.6 | 38.4 | 53.9 | 15.5 | |
| Vert | 9848.000 | AV | 30.7 | 38.5 | 5.9 | 33.0 | 42.1 | 53.9 | 11.8 | |
| Vert | 24620.000 | AV | 34.5 | 38.6 | -1.0 | 32.2 | 39.9 | 53.9 | 14.0 | |

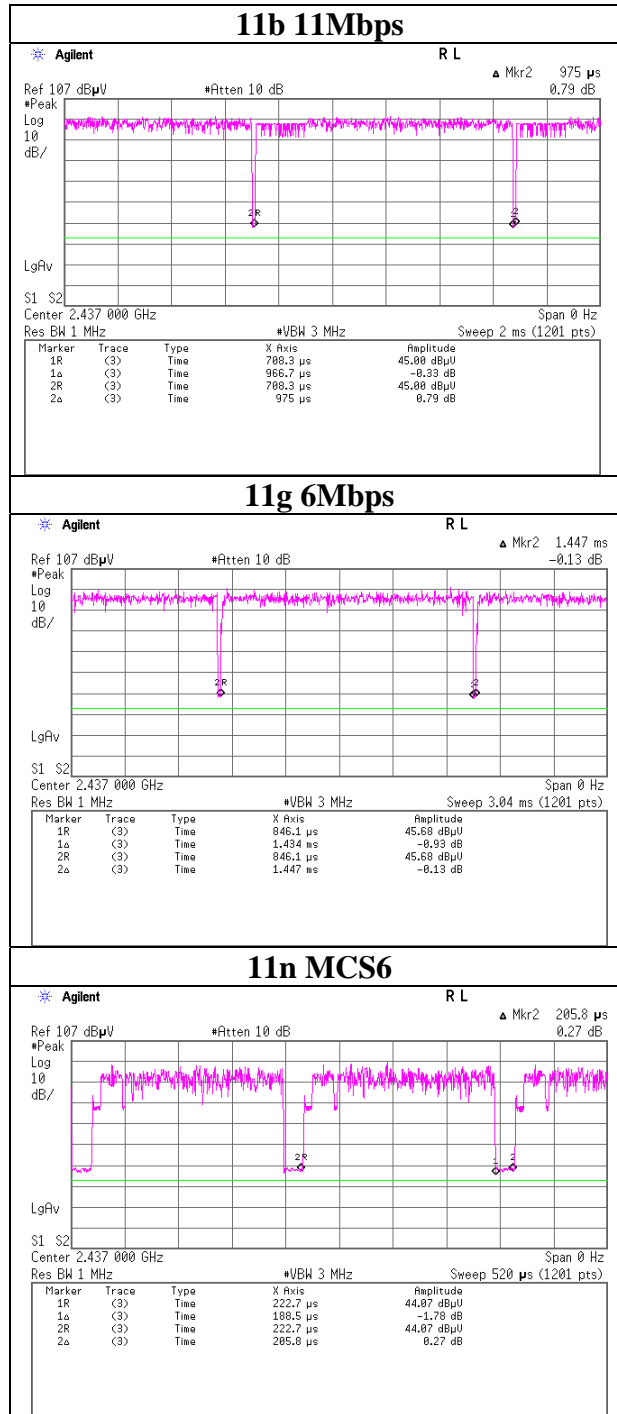
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

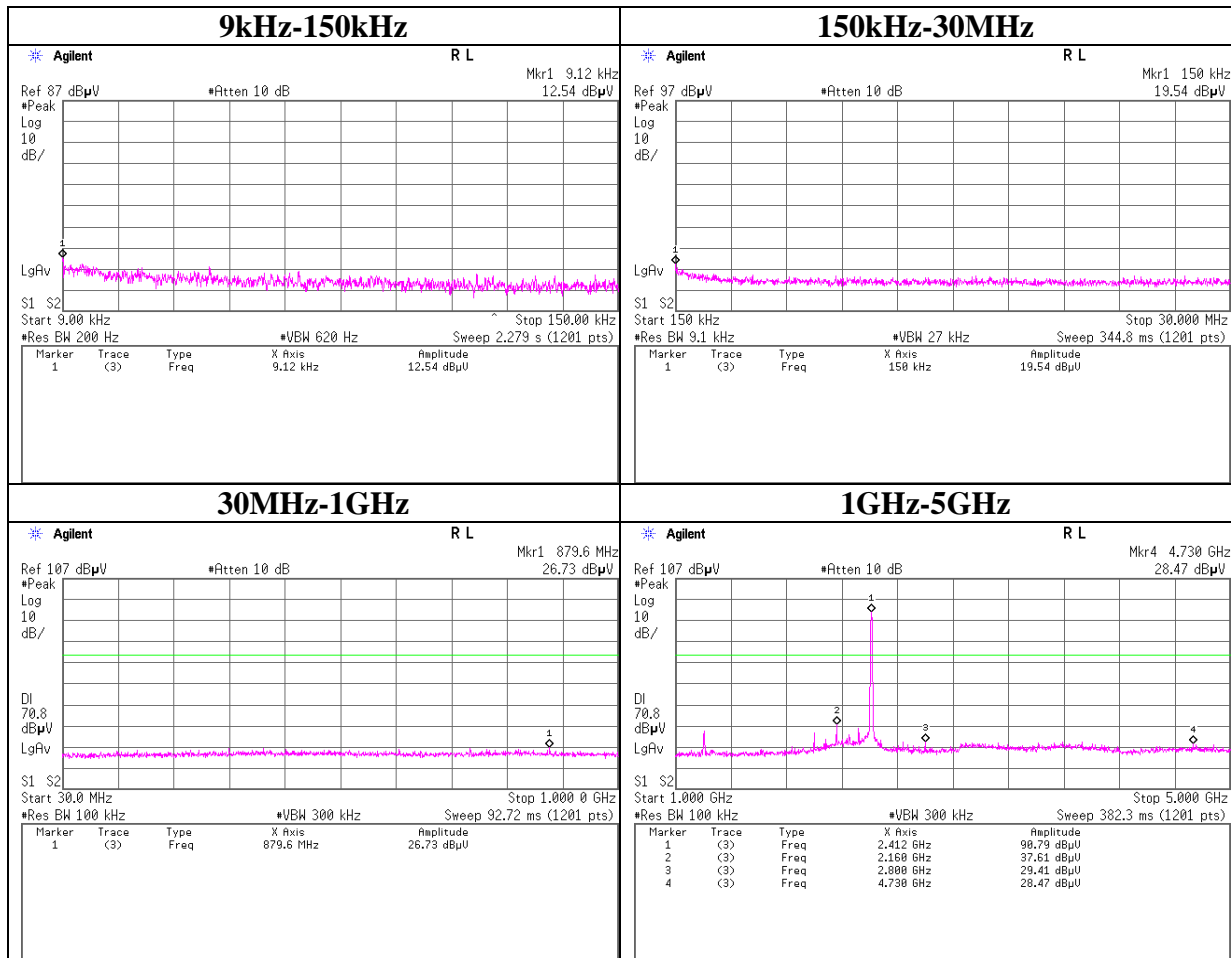
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Burst rate confirmation



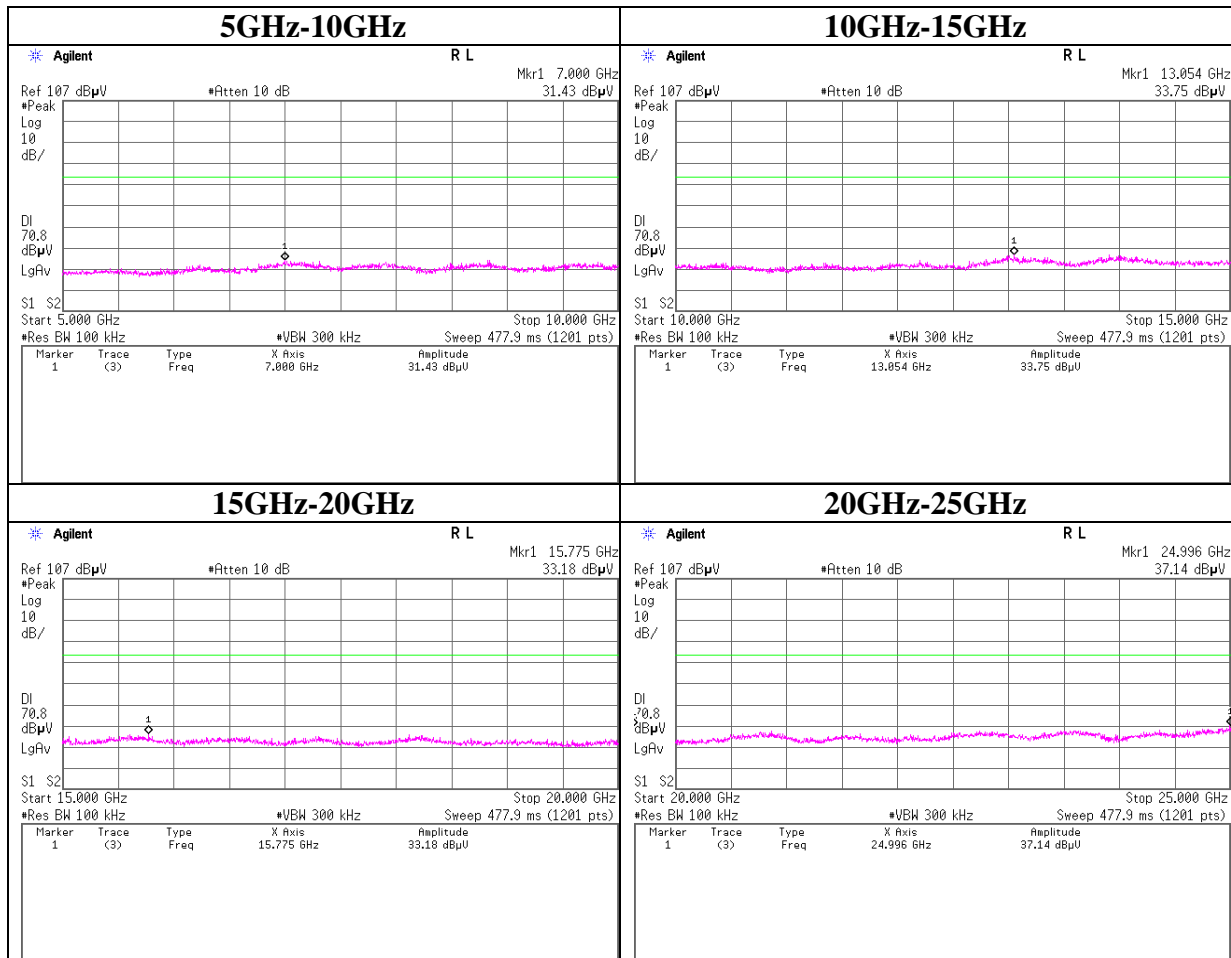
Conducted Spurious Emission

11b Tx 2412MHz



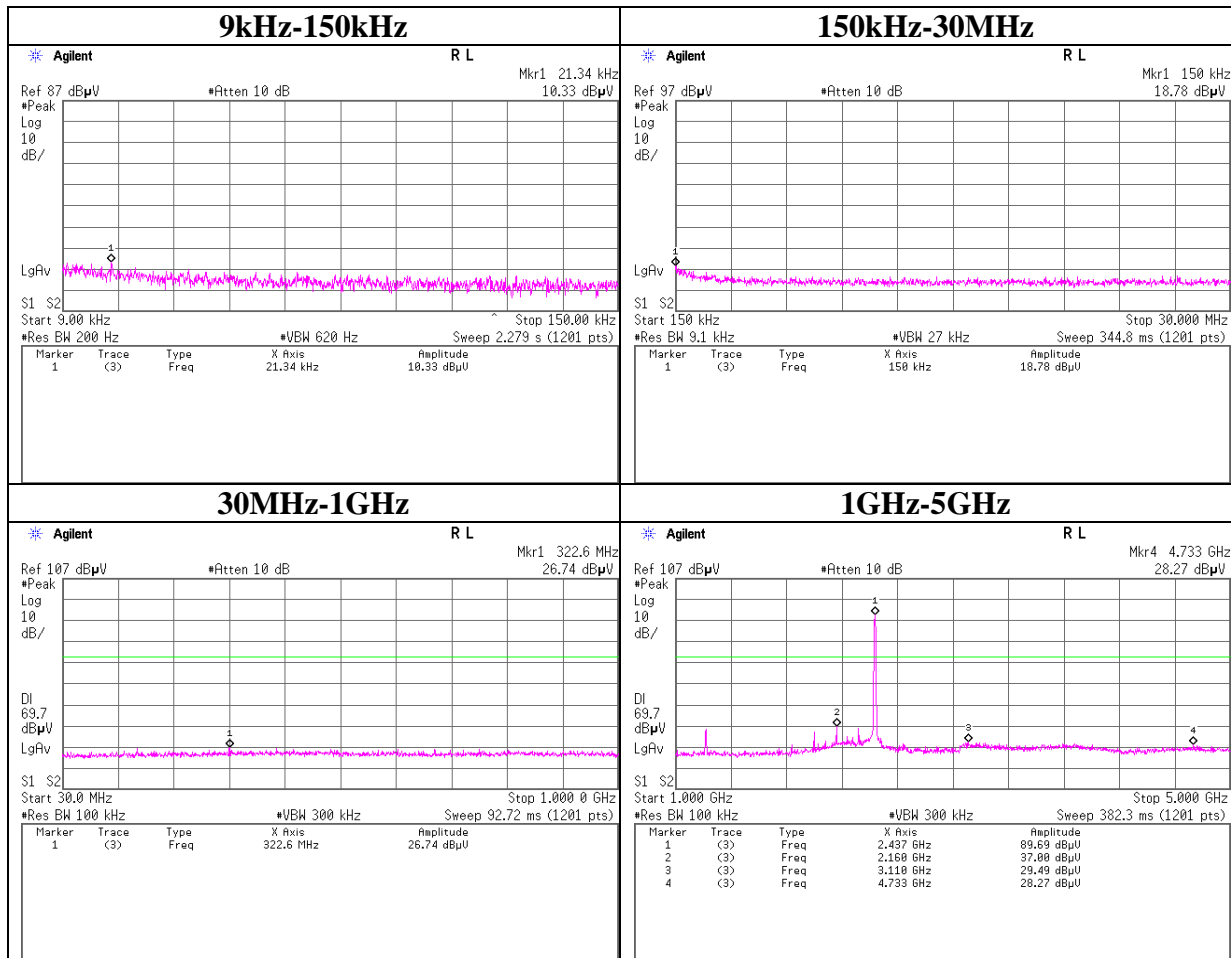
Conducted Spurious Emission

11b Tx 2412MHz



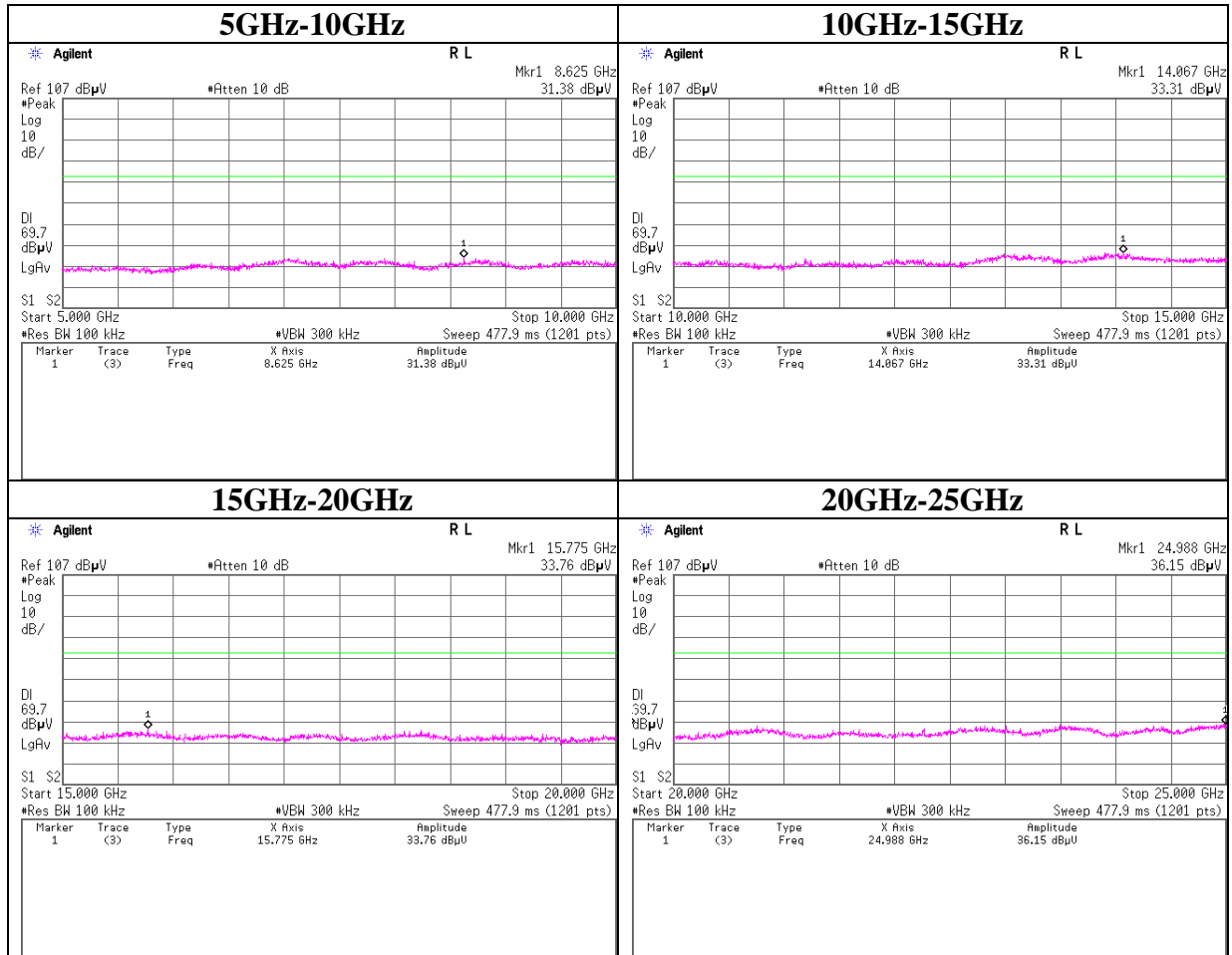
Conducted Spurious Emission

11b Tx 2437MHz



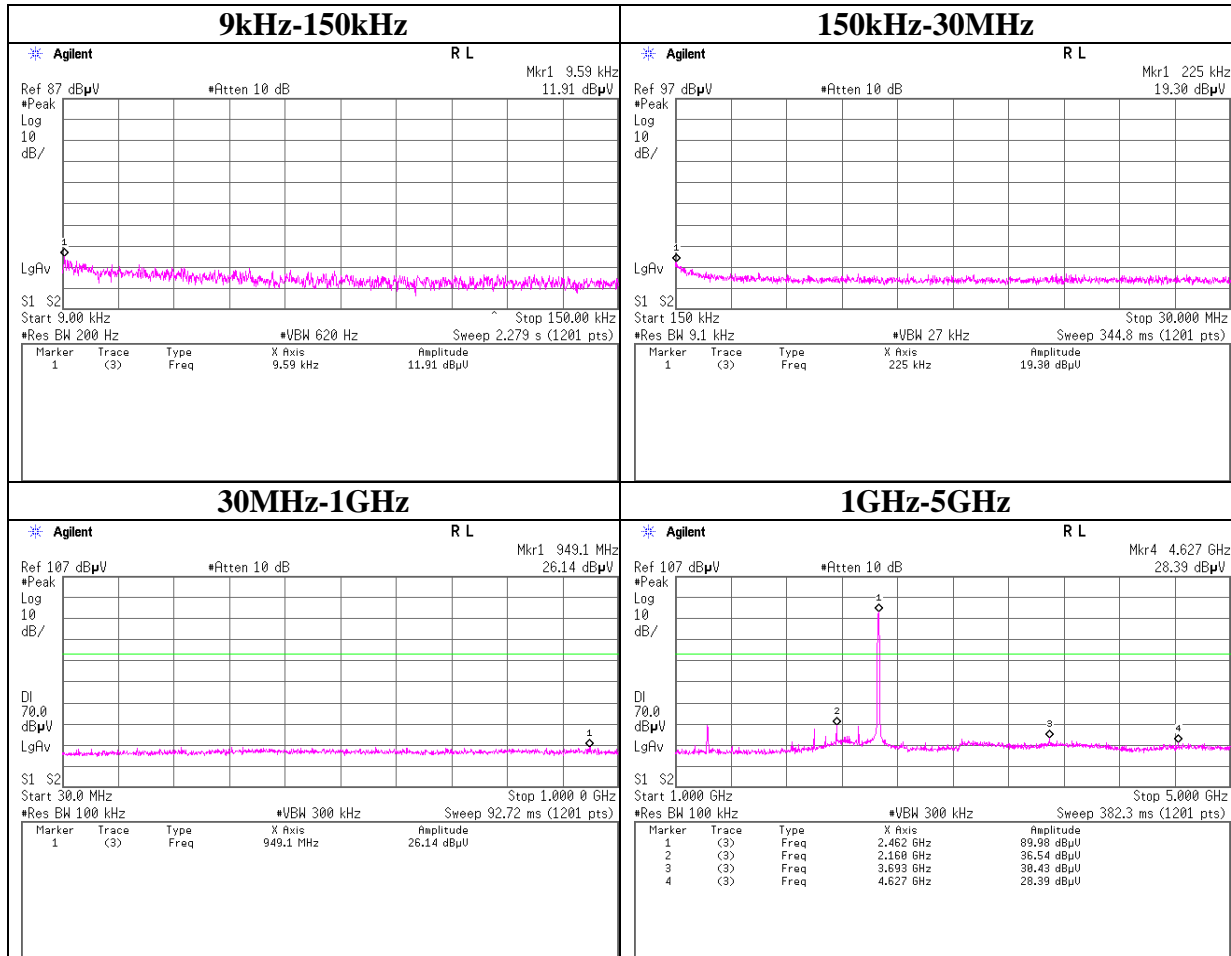
Conducted Spurious Emission

11b Tx 2437MHz



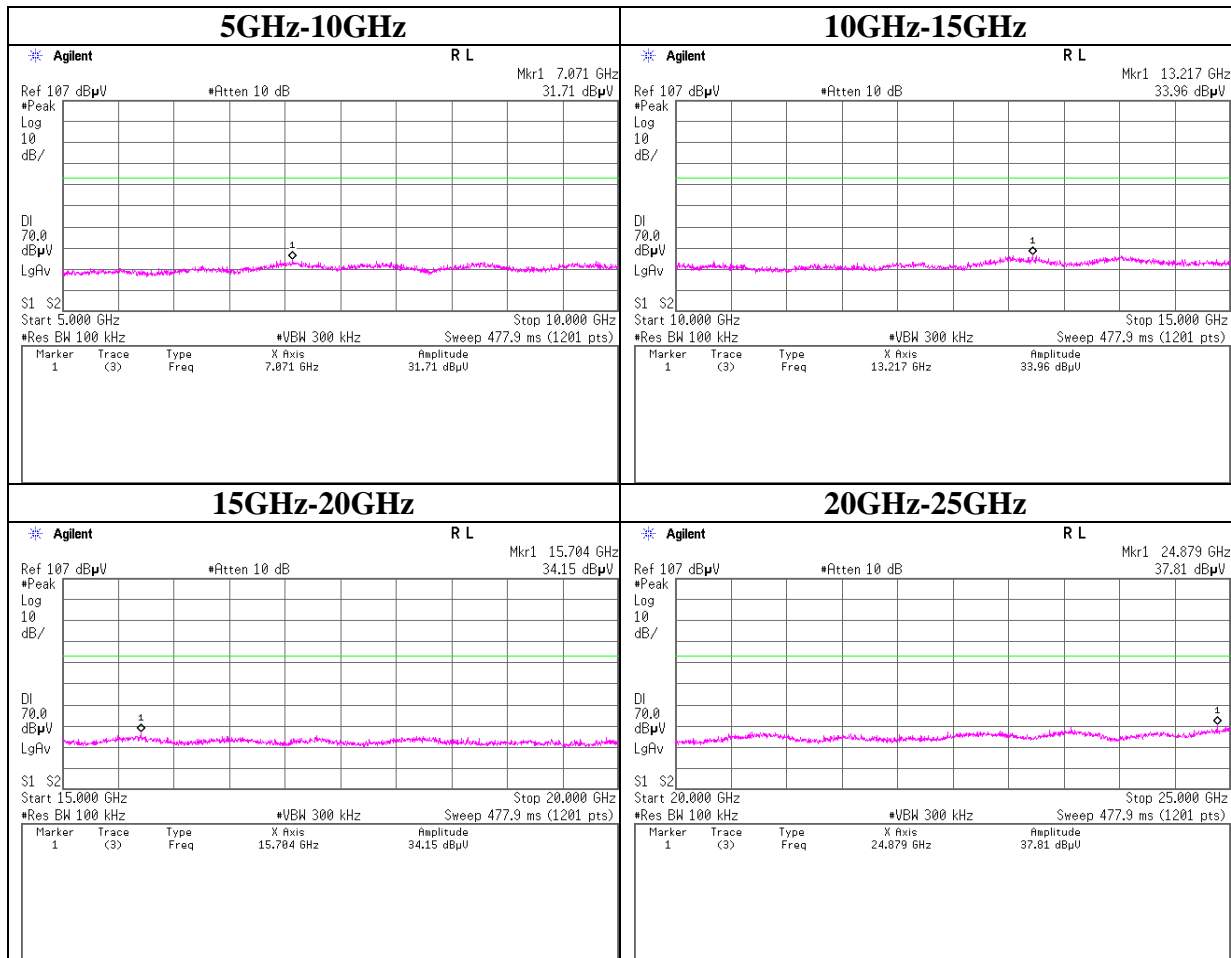
Conducted Spurious Emission

11b Tx 2462MHz



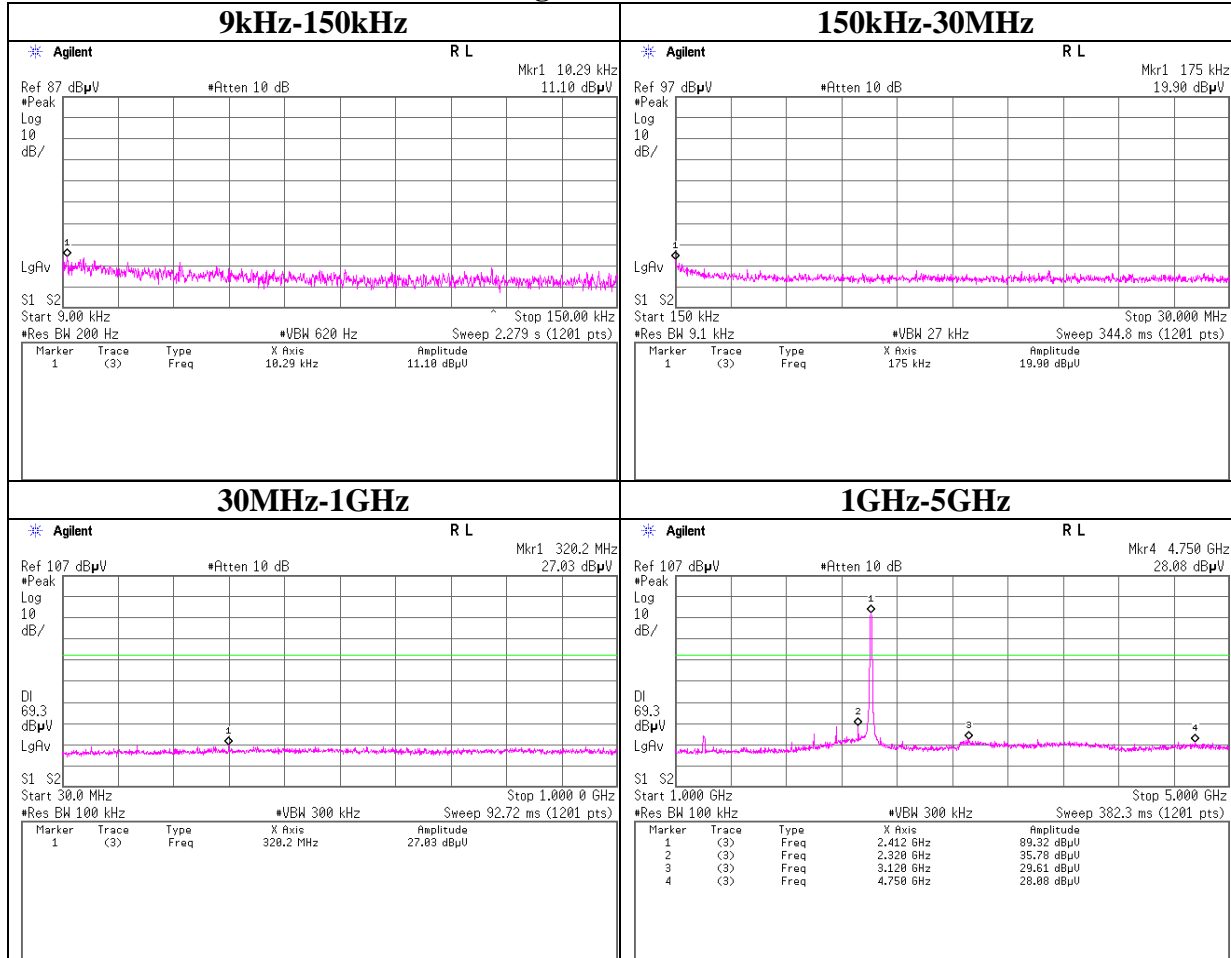
Conducted Spurious Emission

11b Tx 2462MHz



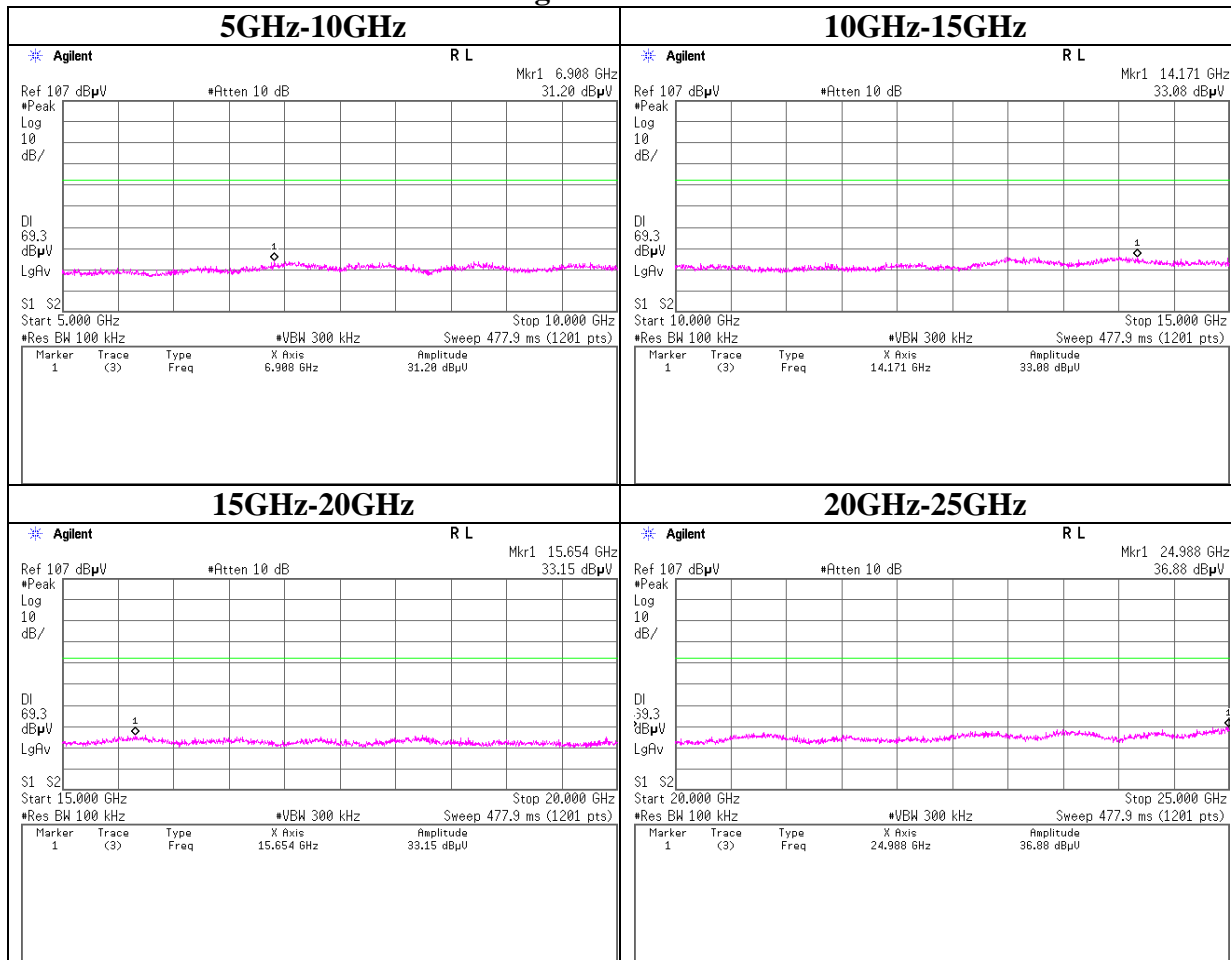
Conducted Spurious Emission

11g Tx 2412MHz



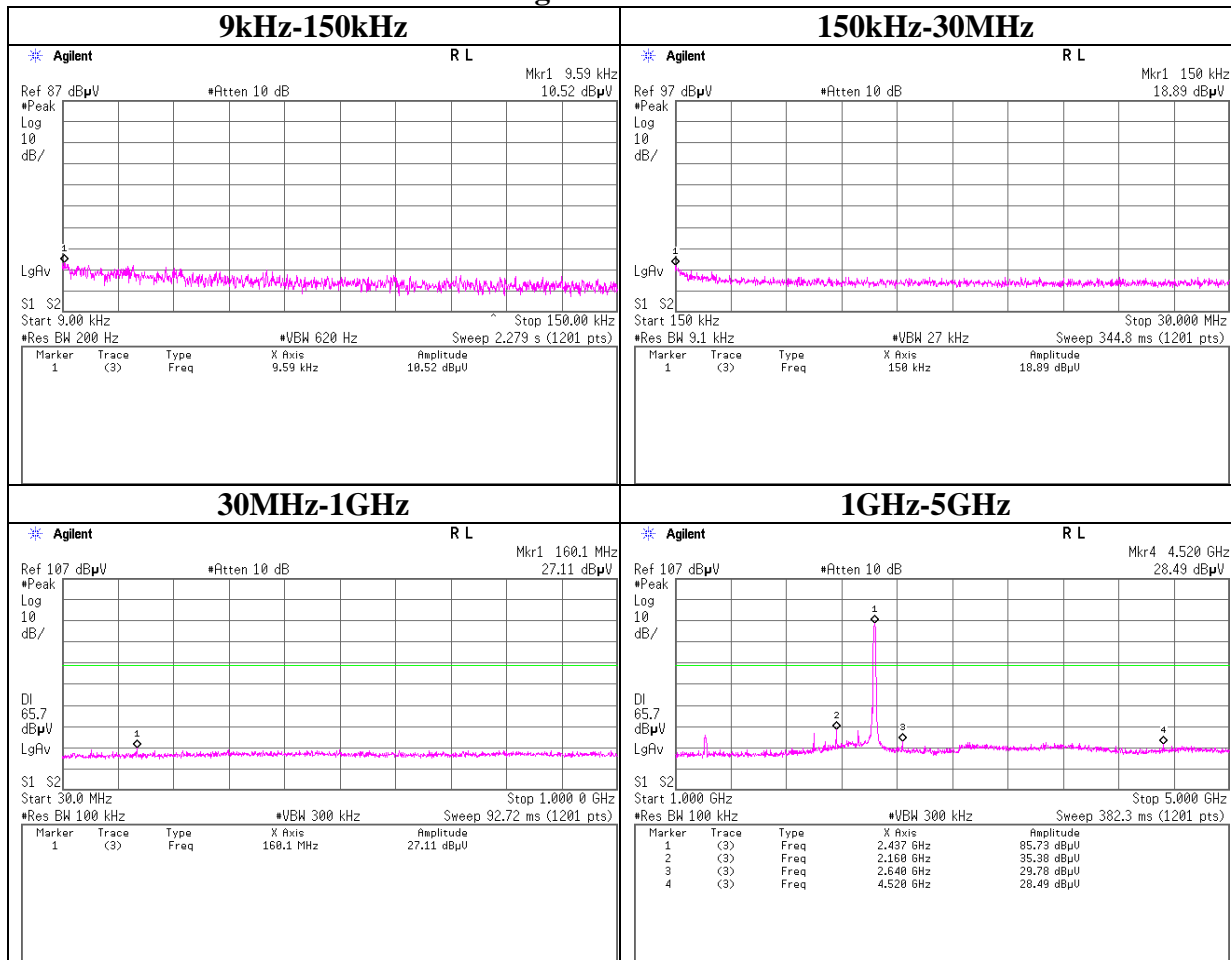
Conducted Spurious Emission

11g Tx 2412MHz



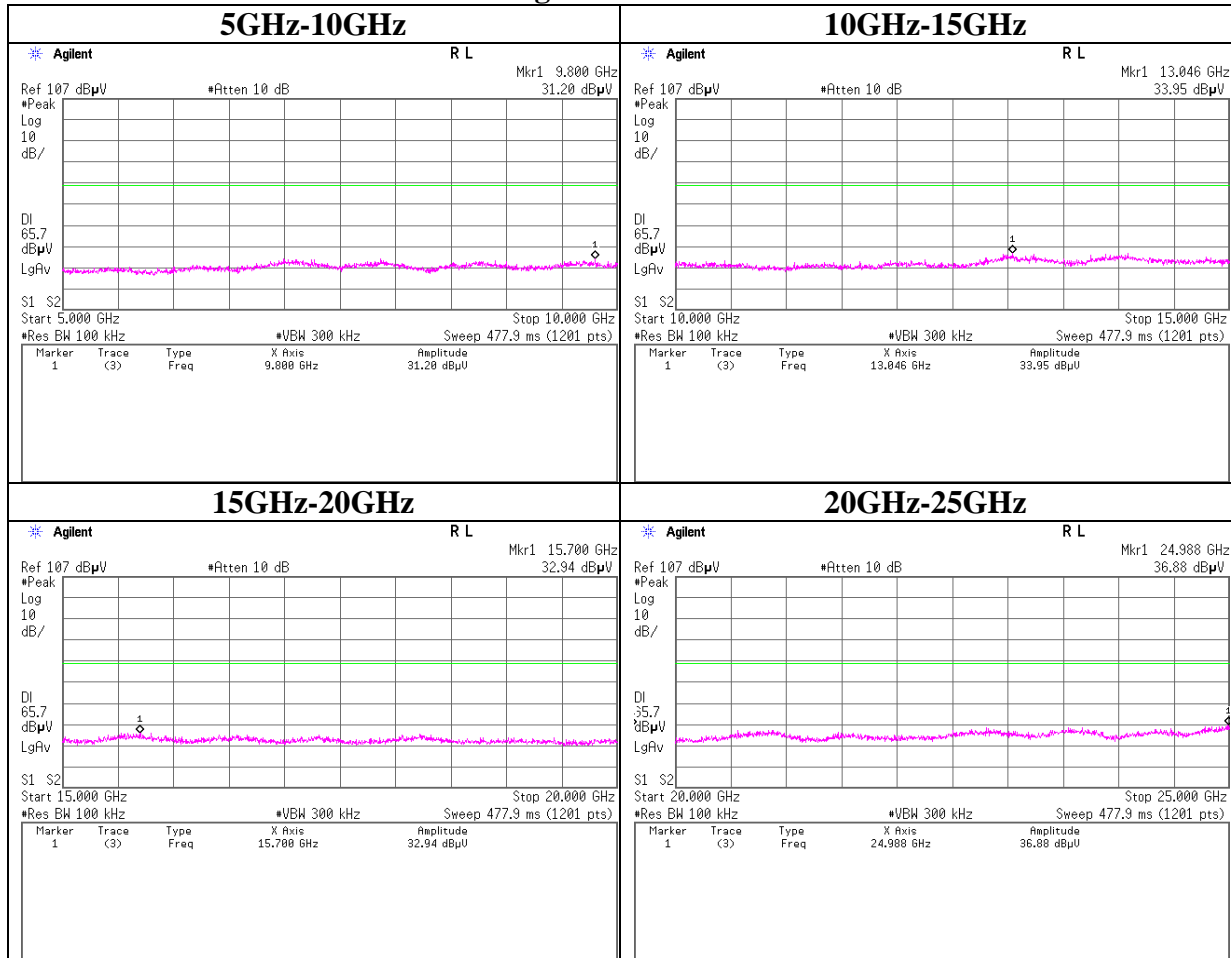
Conducted Spurious Emission

11g Tx 2437MHz



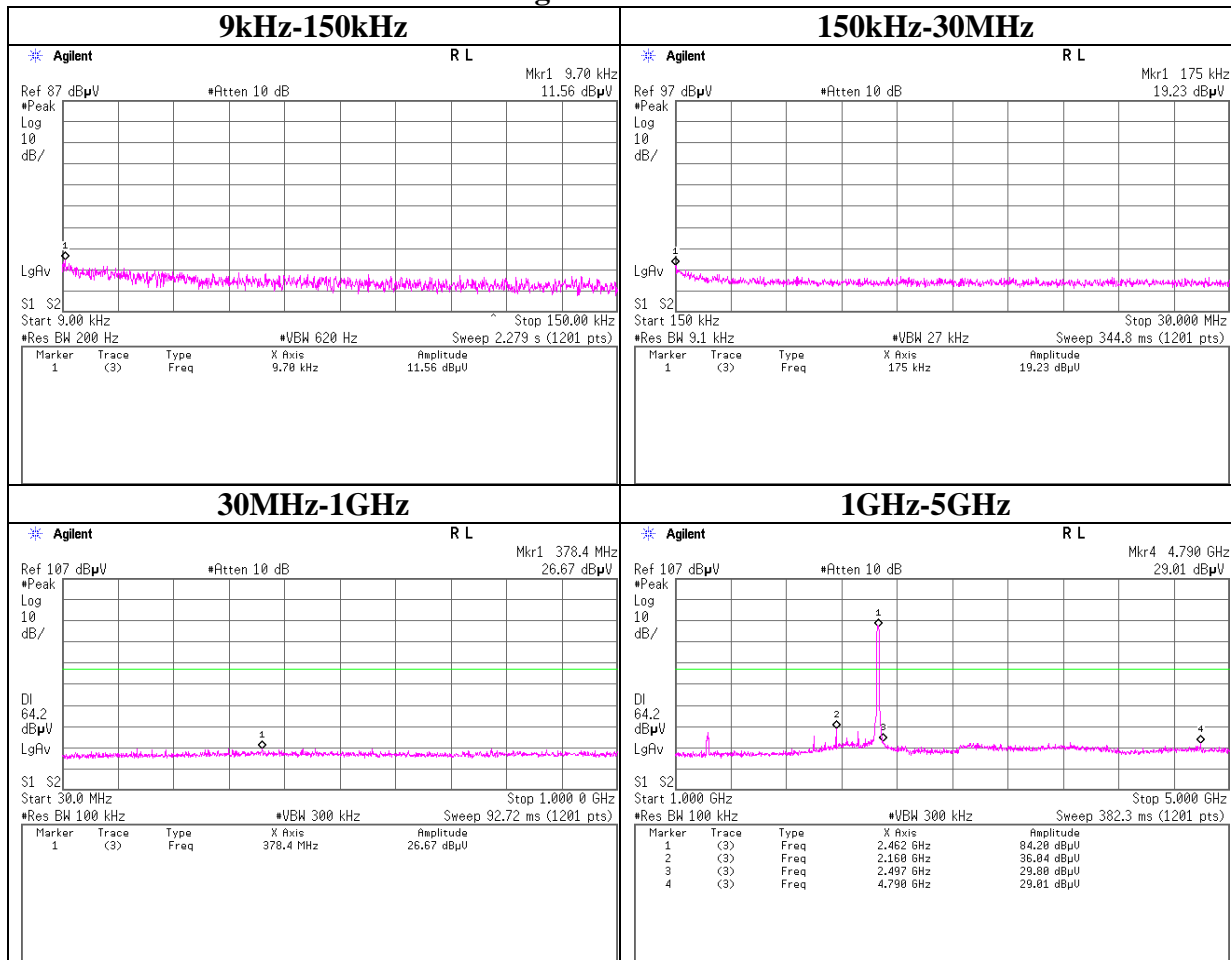
Conducted Spurious Emission

11g Tx 2437MHz



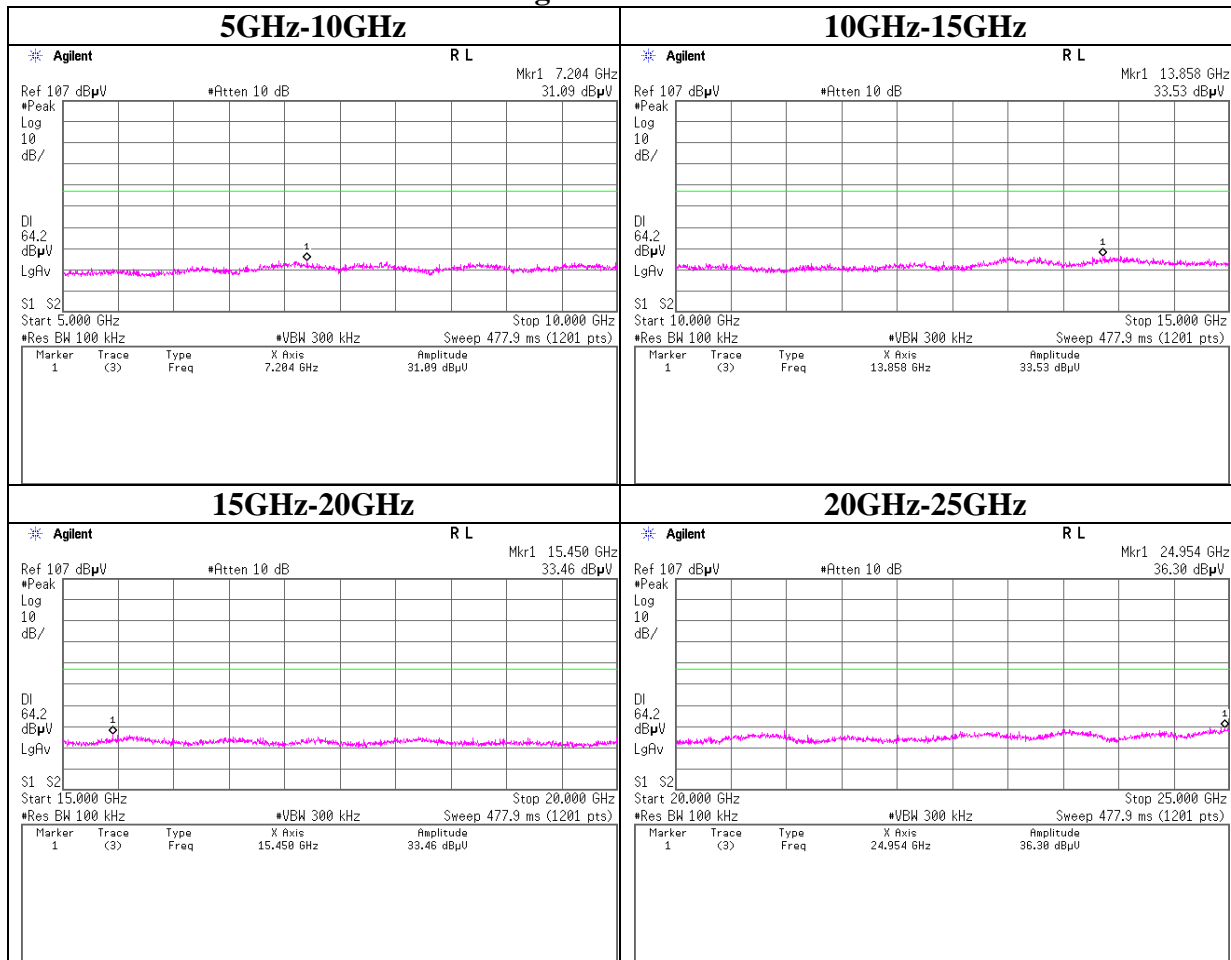
Conducted Spurious Emission

11g Tx 2462MHz



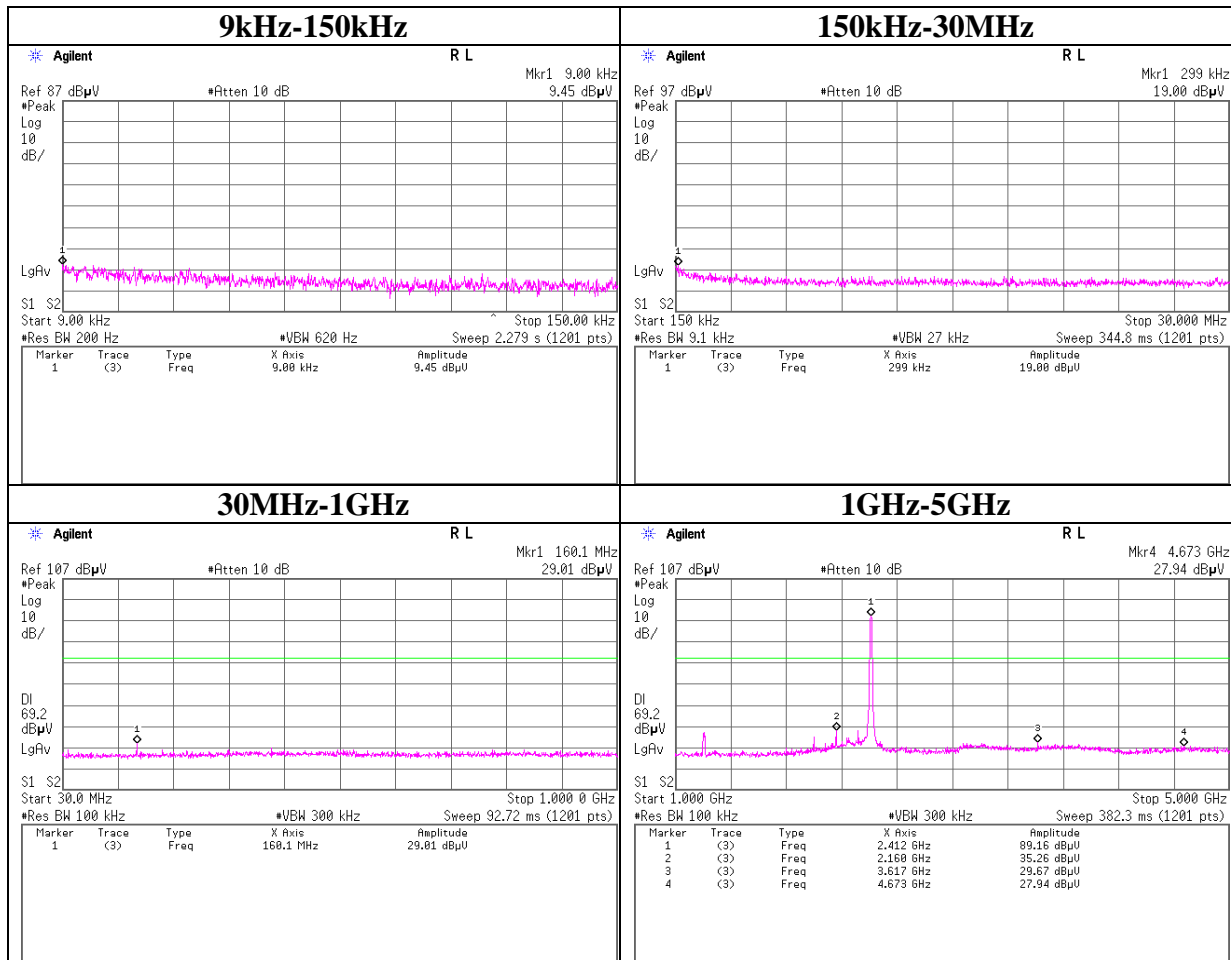
Conducted Spurious Emission

11g Tx 2462MHz



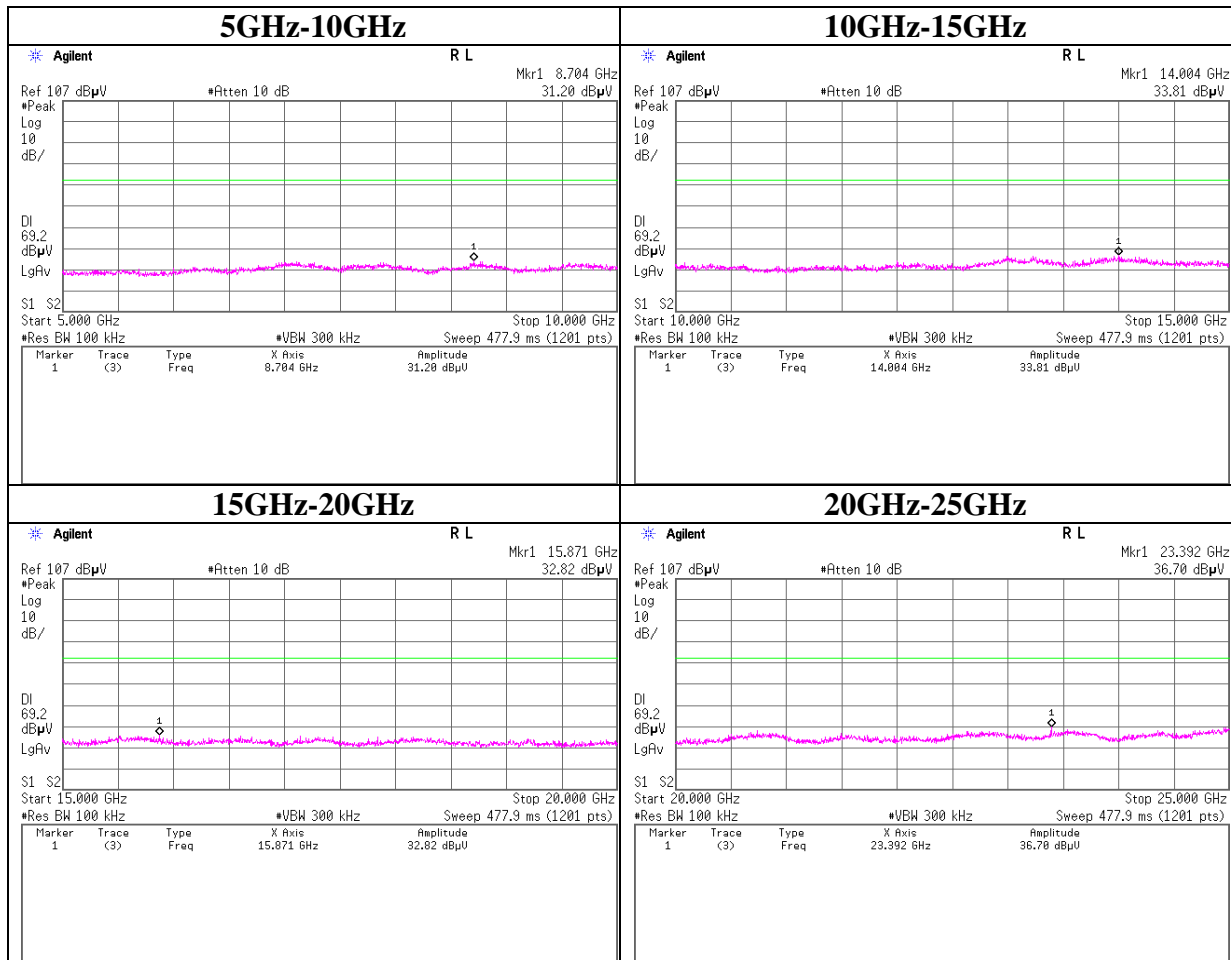
Conducted Spurious Emission

11n Tx 2412MHz



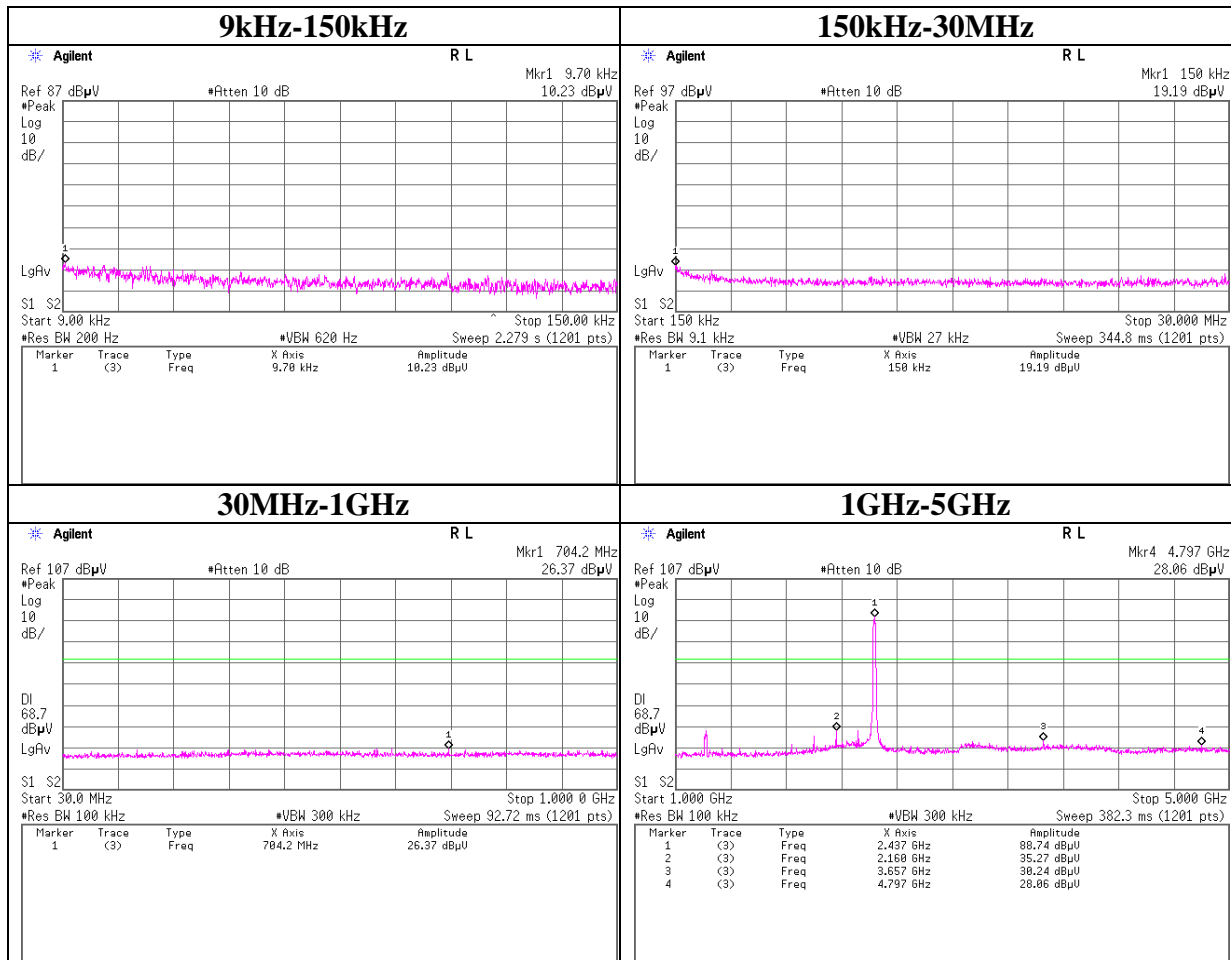
Conducted Spurious Emission

11n Tx 2412MHz



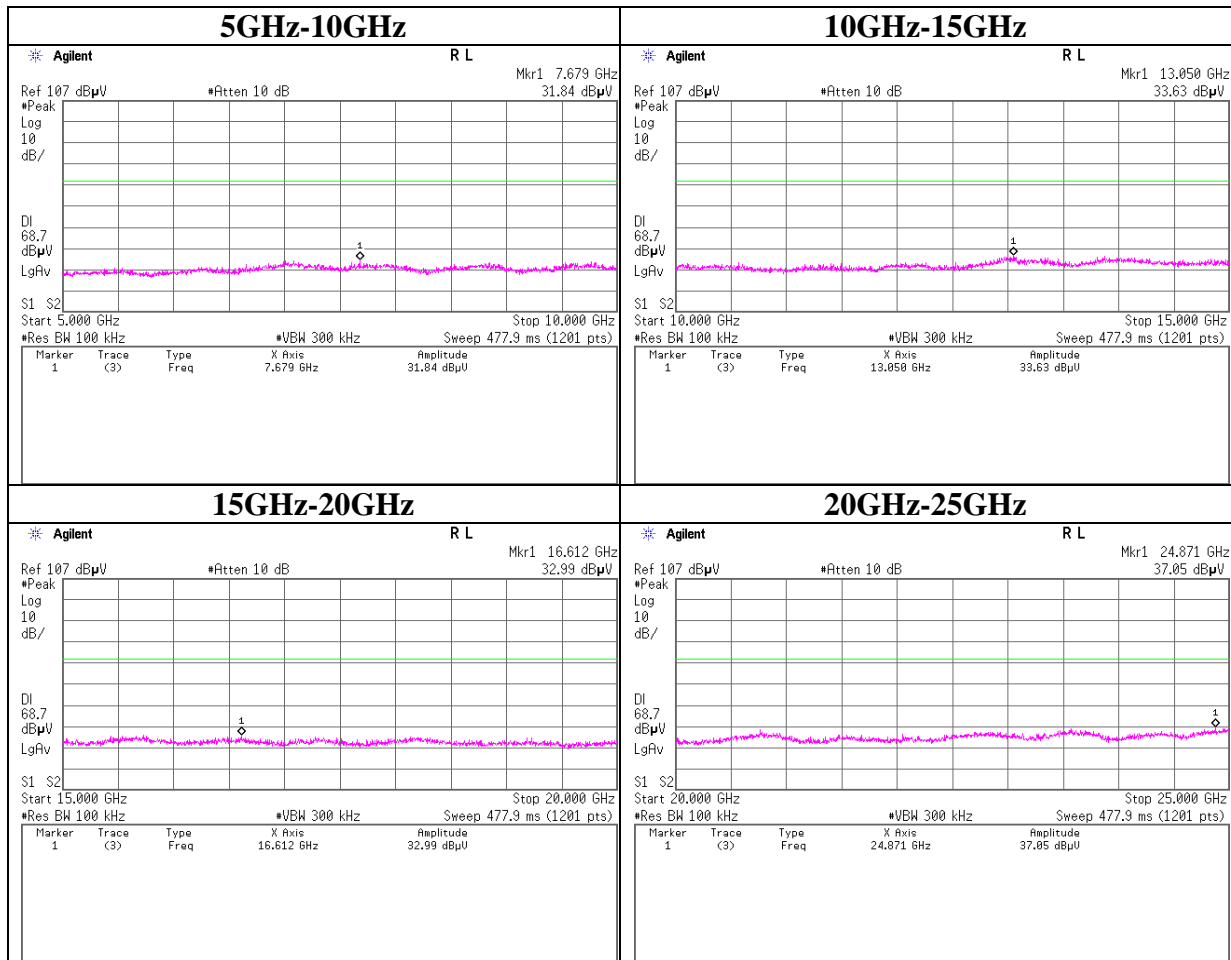
Conducted Spurious Emission

11n Tx 2437MHz



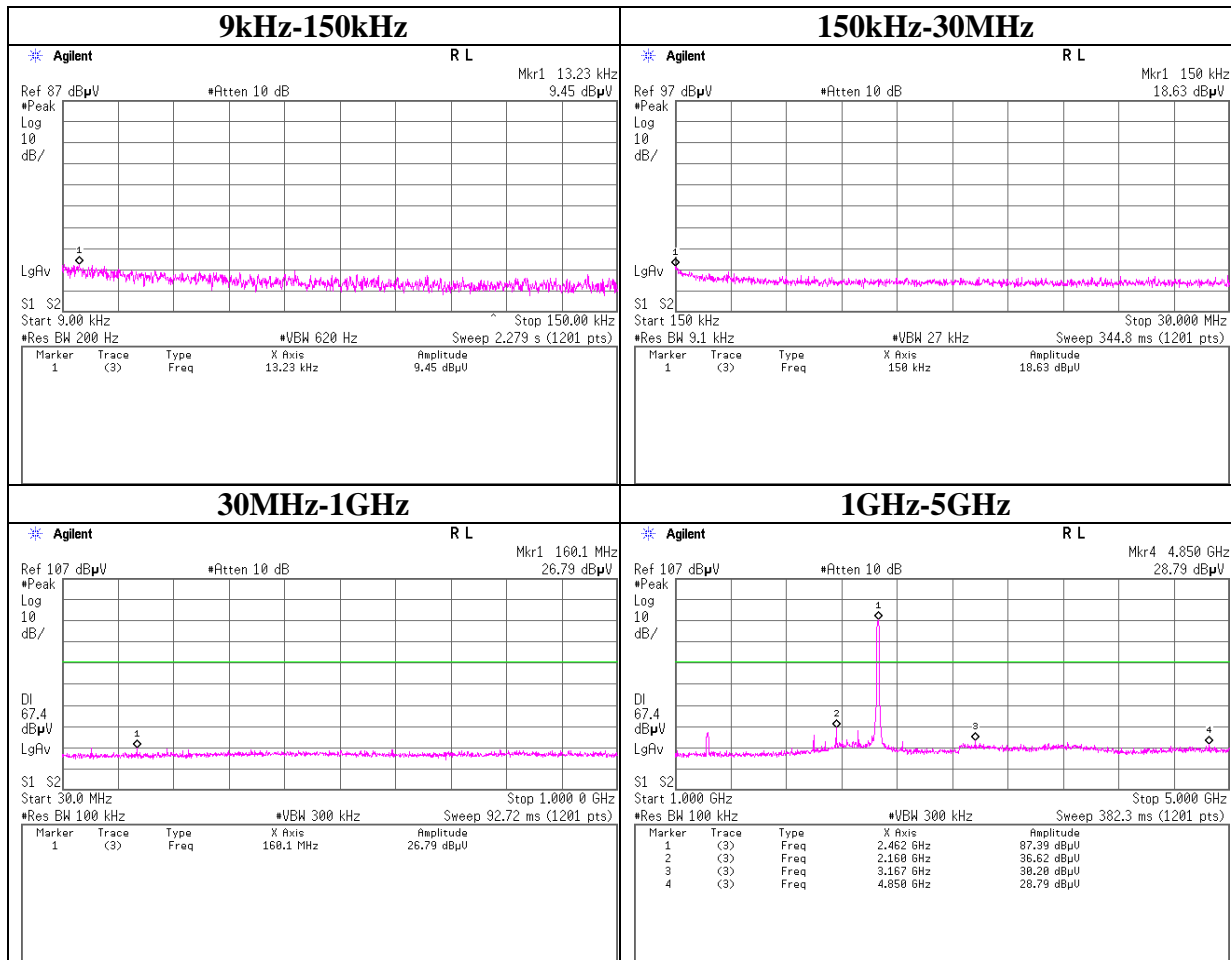
Conducted Spurious Emission

11n Tx 2437MHz



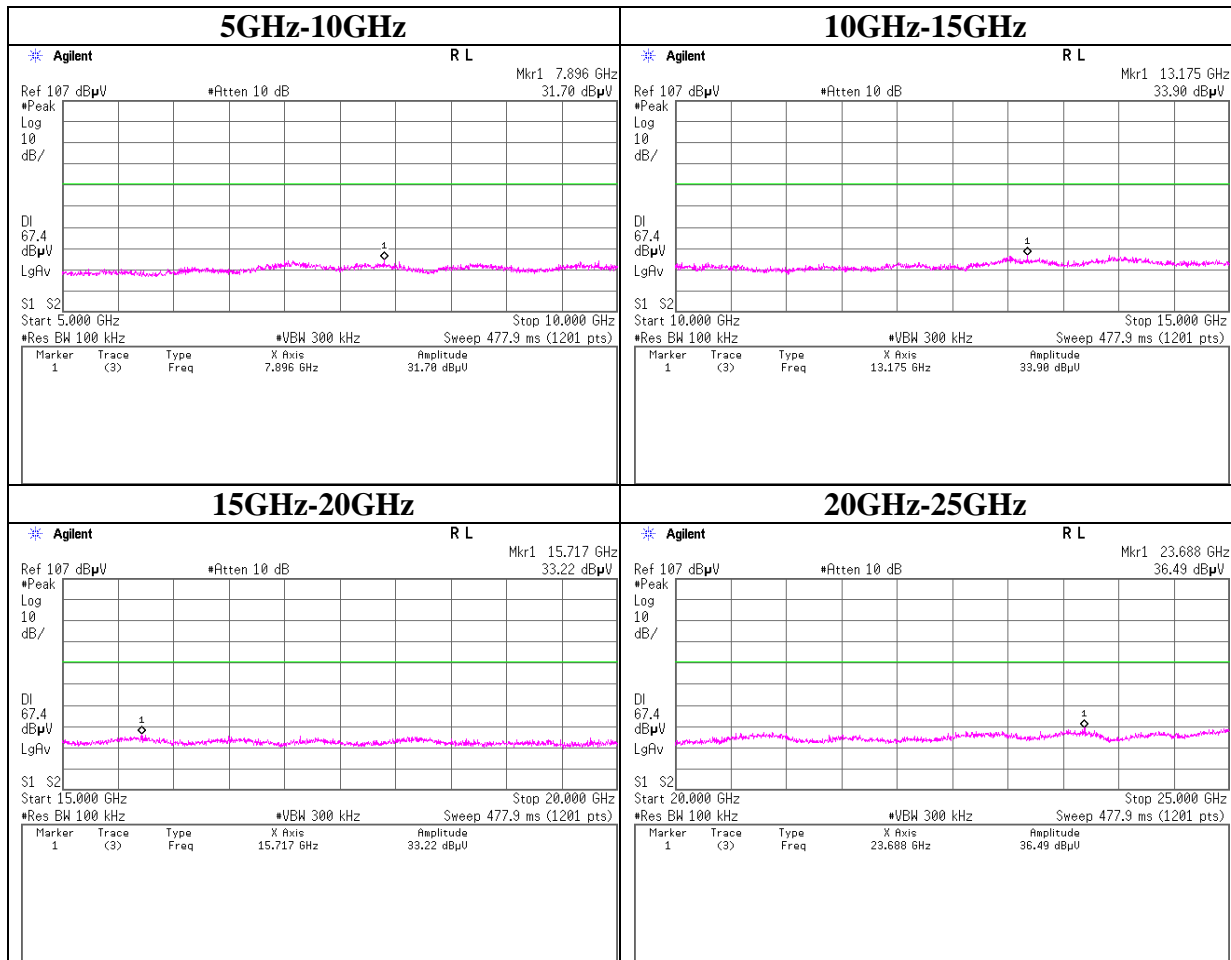
Conducted Spurious Emission

11n Tx 2462MHz



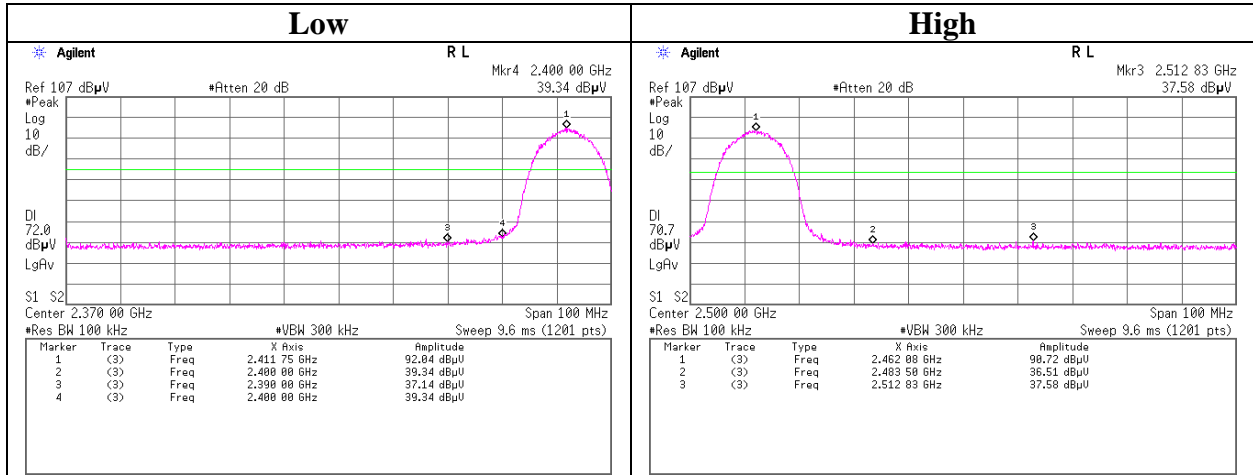
Conducted Spurious Emission

11n Tx 2462MHz

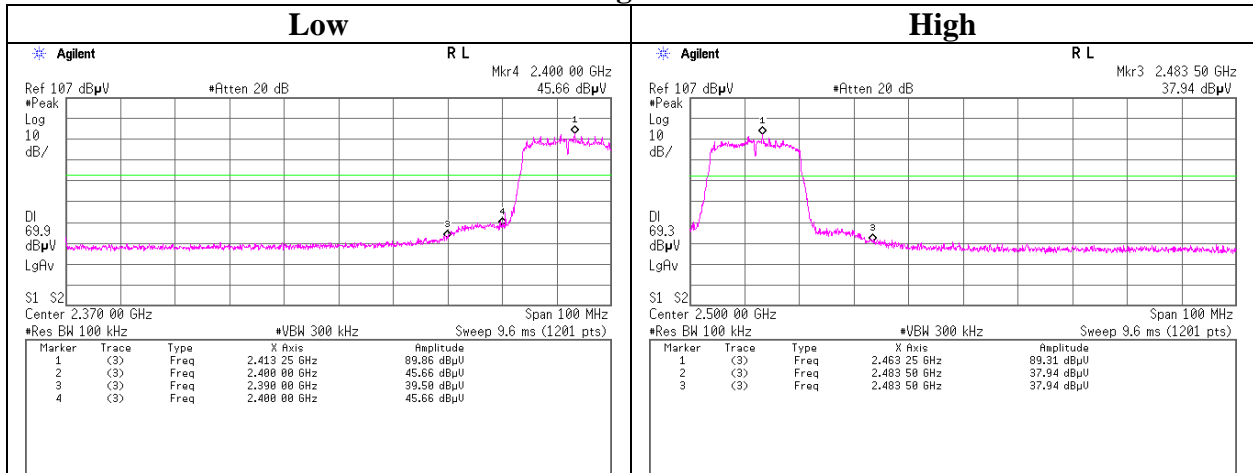


Conducted Emission Band Edge compliance

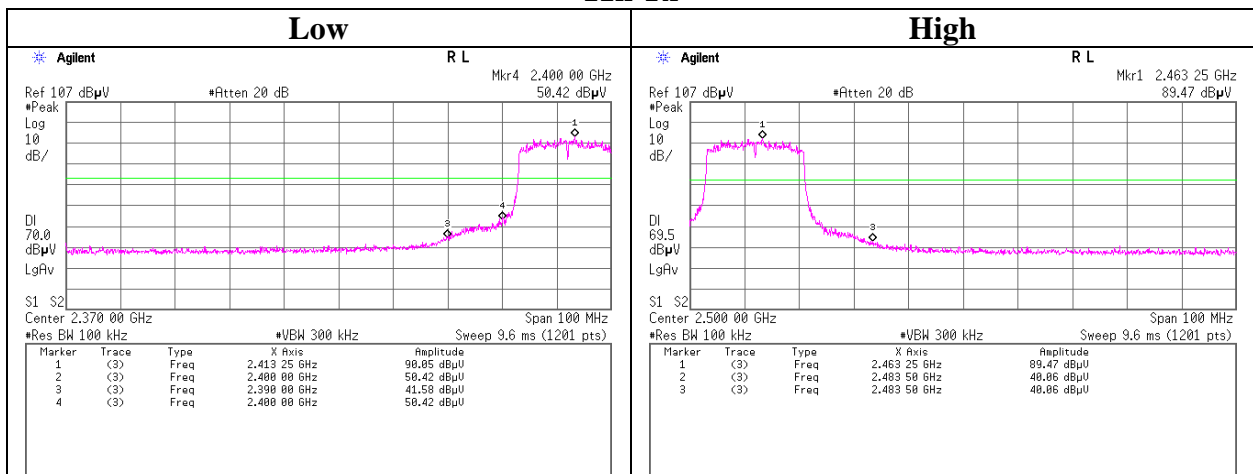
11b Tx



11g Tx



11n Tx



Power Density

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32HE0238-HO-03
Date 05/18/2012
Temperature/ Humidity 23 deg. C / 41% RH
Engineer Takumi Shimada
Mode 11b Tx, 11g Tx, 11n-20 Tx

11b

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|----------------|------------------|-----------------------|----------------|-----------------|----------------|----------------|
| 2412.00 | -19.06 | 1.23 | 10.00 | -7.83 | 8.00 | 15.83 |
| 2437.00 | -19.01 | 1.24 | 10.00 | -7.77 | 8.00 | 15.77 |
| 2462.00 | -19.52 | 1.25 | 10.00 | -8.27 | 8.00 | 16.27 |

11g

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|----------------|------------------|-----------------------|----------------|-----------------|----------------|----------------|
| 2412.00 | -21.16 | 1.23 | 10.00 | -9.93 | 8.00 | 17.93 |
| 2437.00 | -21.27 | 1.24 | 10.00 | -10.03 | 8.00 | 18.03 |
| 2462.00 | -21.48 | 1.25 | 10.00 | -10.23 | 8.00 | 18.23 |

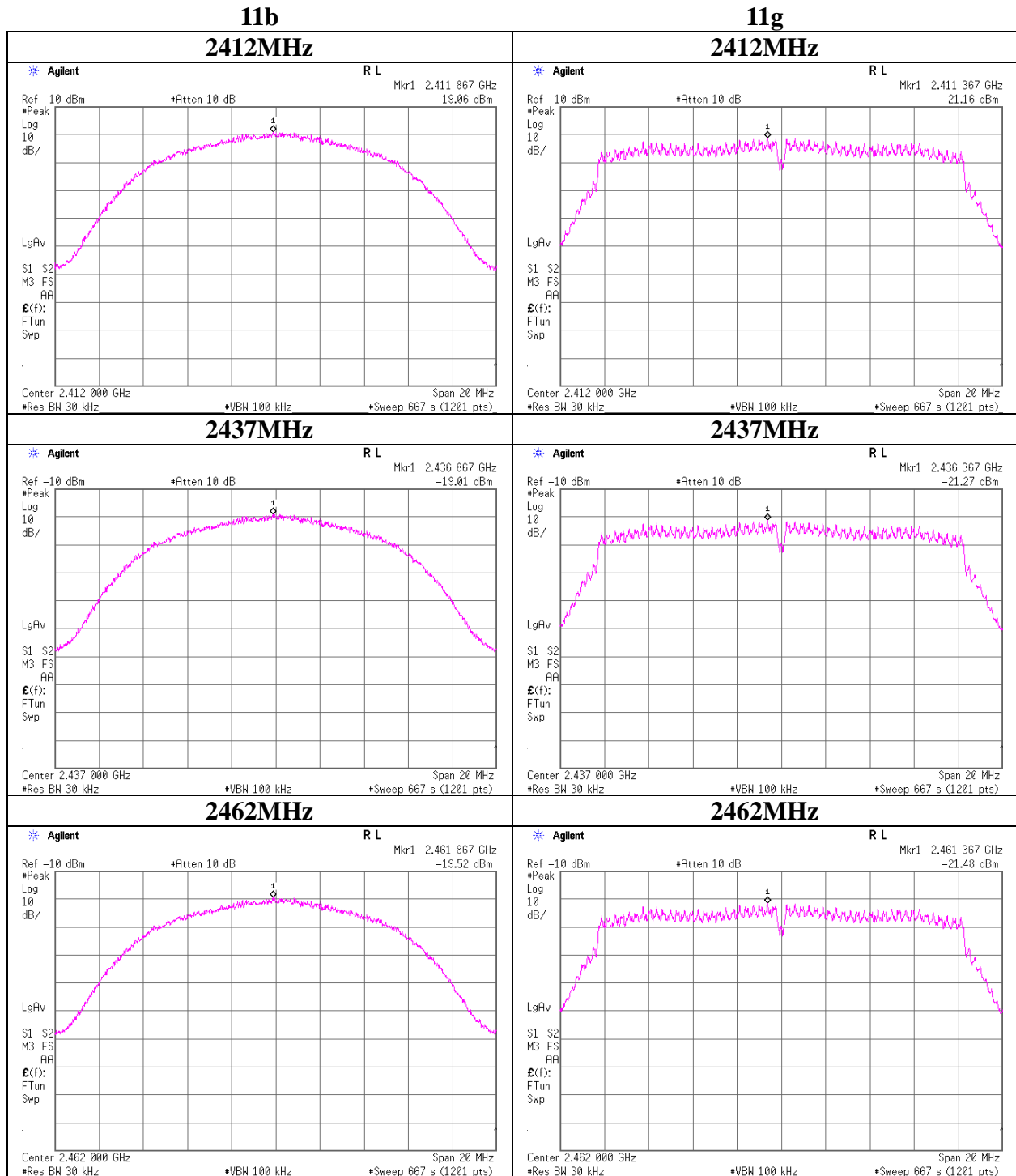
11n-20

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|----------------|------------------|-----------------------|----------------|-----------------|----------------|----------------|
| 2412.00 | -21.32 | 1.23 | 10.00 | -10.09 | 8.00 | 18.09 |
| 2437.00 | -21.33 | 1.24 | 10.00 | -10.09 | 8.00 | 18.09 |
| 2462.00 | -21.84 | 1.25 | 10.00 | -10.59 | 8.00 | 18.59 |

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

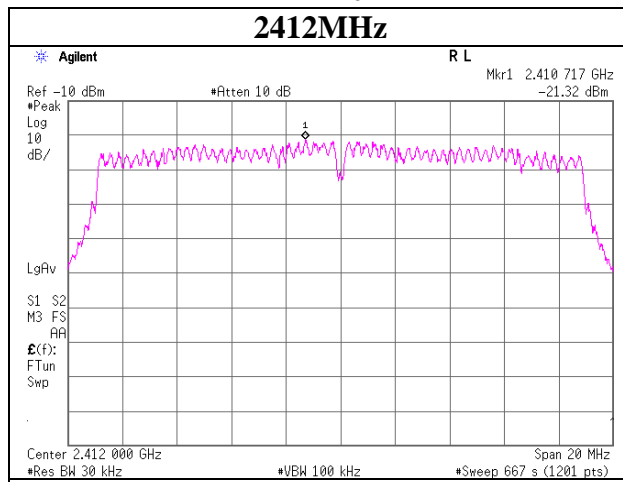
Power Density



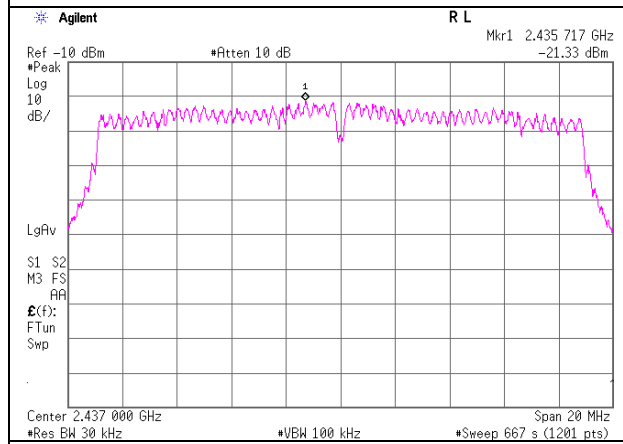
Power Density

11n-20

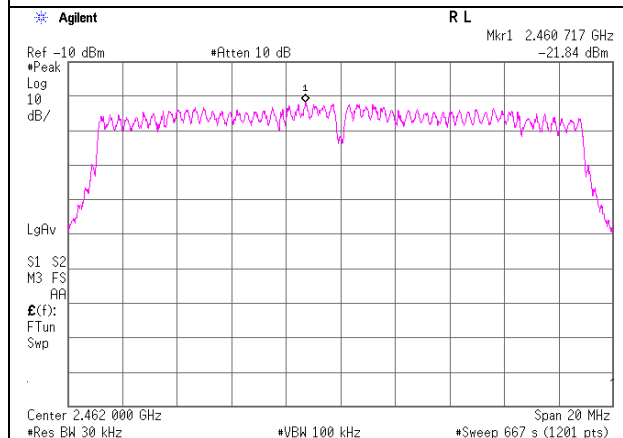
2412MHz



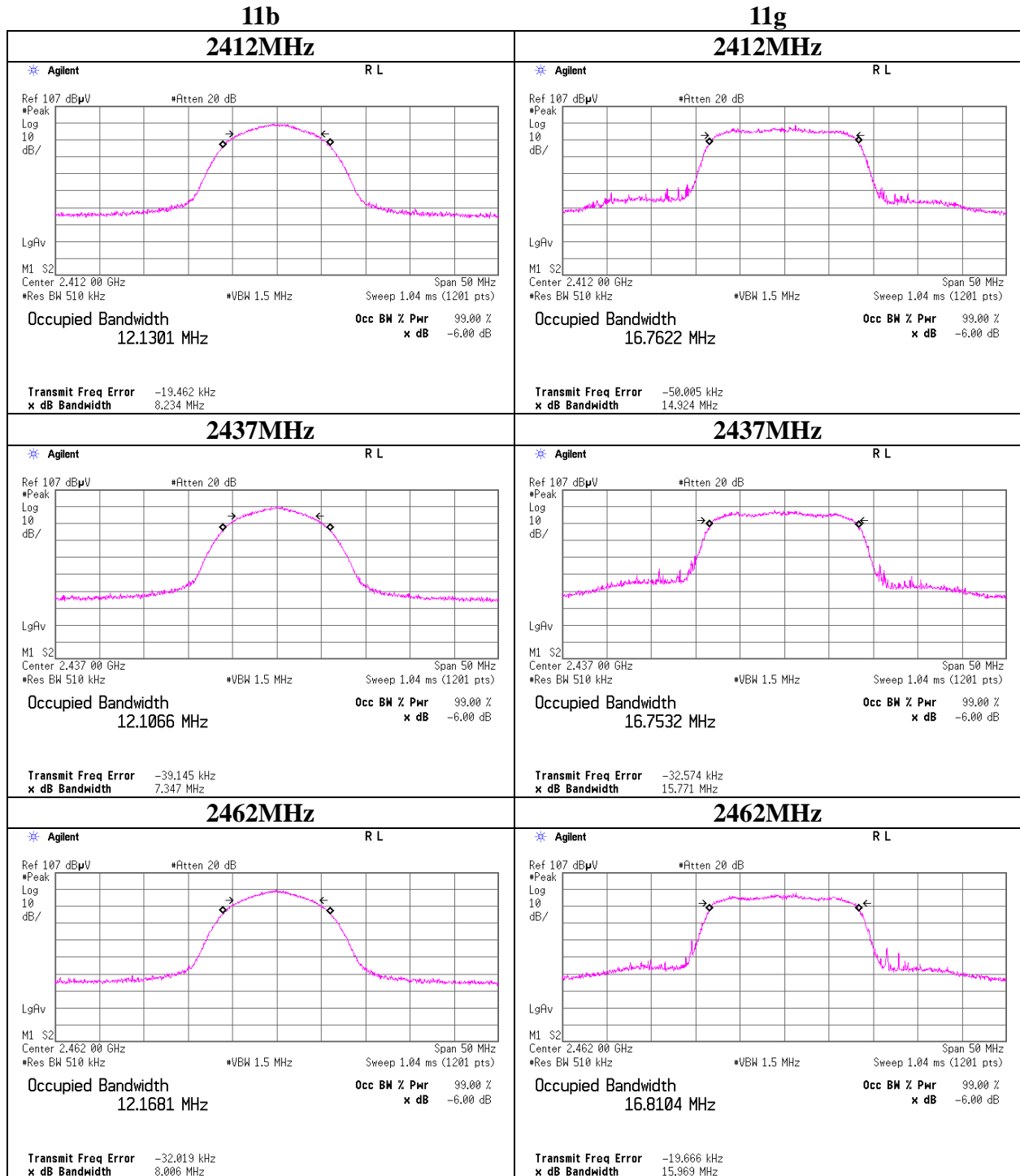
2437MHz



2462MHz



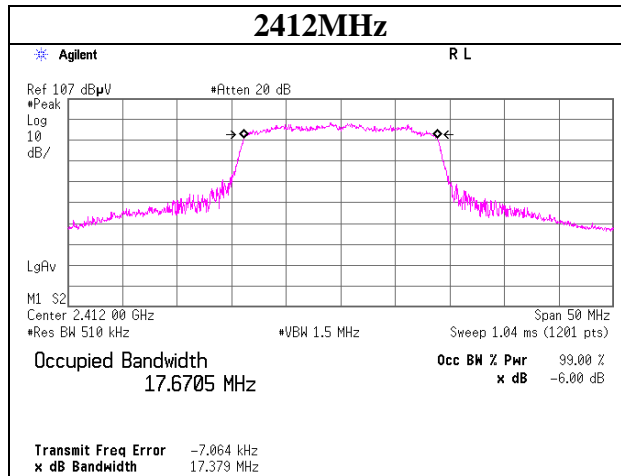
99%Occupied Bandwidth



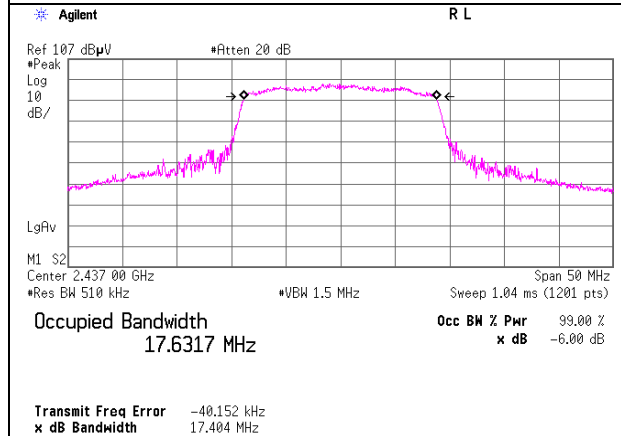
99% Occupied Bandwidth

11n-20

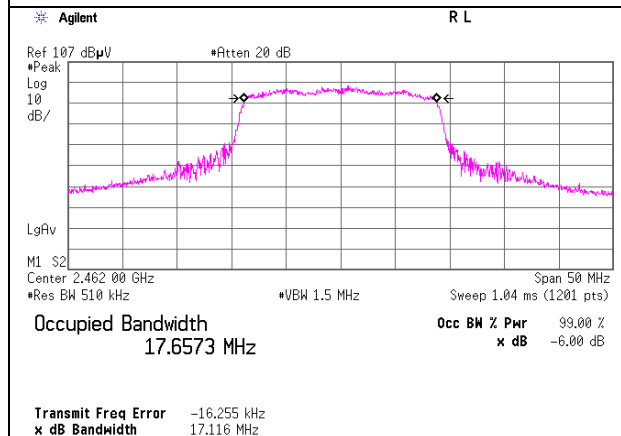
2412MHz



2437MHz



2462MHz



APPENDIX 2: Test instruments

EMI test equipment

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|-------------|------------------------------|----------------------|---|-----------------------------|-----------|---------------------------------------|
| MOS-04 | Digital Humidity Indicator | N.T | NT-1800 | MOS04 | AT | 2012/02/06 * 12 |
| MBM-11 | Barometer | Sunoh | SBR121 | 839 | AT | 2010/12/13 * 36 |
| MSA-04 | Spectrum Analyzer | Agilent | E4448A | US44300523 | AT/RE/CE | 2012/04/06 * 12 |
| MCC-138 | Microwave cable | HUBER+SUHNER | SUCOFLEX 102 | 37953/2 | AT | 2011/10/28 * 12 |
| MAT-24 | Attenuator(10dB)(above1 GHz) | Agilent | 8493C | 71389 | AT | 2011/06/23 * 12 |
| MPM-09 | Power Meter | Anritsu | ML2495A | 6K00003348 | AT | 2011/09/12 * 12 |
| MPSE-12 | Power sensor | Anritsu | MA2411B | 011598 | AT | 2011/09/12 * 12 |
| MSA-10 | Spectrum Analyzer | Agilent | E4448A | MY46180655 | AT | 2012/02/03 * 12 |
| MAT-22 | Attenuator(10dB) 1-18GHz | Orient Microwave | BX10-0476-00 | - | AT | 2012/03/27 * 12 |
| MCC-66 | Microwave Cable 1G-40GHz | Suhner | SUCOFLEX102 | 28636/2 | AT | 2012/04/25 * 12 |
| MOS-14 | Thermo-Hygrometer | Custom | CTH-201 | - | AT | 2012/02/06 * 12 |
| MAEC-04 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE/CE | 2012/02/29 * 12 |
| MOS-15 | Thermo-Hygrometer | Custom | CTH-180 | - | RE/CE | 2012/02/06 * 12 |
| MJM-07 | Measure | PROMART | SEN1955 | - | RE/CE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE/CE | - |
| MHA-21 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 9120D-557 | RE | 2011/08/11 * 12 |
| MCC-141 | Microwave Cable | Junkosha | MWX221 | 1203S212(1m) / 1204S062(5m) | RE | 2012/04/23 * 12 |
| MPA-12 | MicroWave System Amplifier | Agilent | 83017A | MY39500780 | RE | 2012/03/28 * 12 |
| MHA-17 | Horn Antenna 15-40GHz | Schwarzbeck | BBHA9170 | BBHA9170307 | RE | 2011/06/17 * 12 |
| MHF-06 | High Pass Filter 3.5-24GHz | TOKIMEC | TF323DCA | 601 | RE | 2011/05/16 * 12 |
| MBA-05 | Biconical Antenna | Schwarzbeck | BBA9106 | 1302 | RE | 2011/11/16 * 12 |
| MLA-08 | Logperiodic Antenna | Schwarzbeck | UKLP9140-A | N/A | RE | 2011/11/16 * 12 |
| AT-38 | Attenuator | Anritsu | MP721B | 6200961025 | RE | 2011/12/08 * 12 |
| MCC-50 | Coaxial Cable | UL Japan | - | - | RE | 2012/03/15 * 12 |
| MPA-14 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260833 | RE | 2012/03/05 * 12 |
| MTR-07 | Test Receiver | Rohde & Schwarz | ESCI | 100635 | RE | 2012/04/05 * 12 |
| MSA-05 | Spectrum Analyzer | Advantest | R3273 | 160400285 | CE | 2011/11/23 * 12 |
| MLS-06 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127363 | CE(EUT) | 2012/02/06 * 12 |
| MLS-07 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127364 | CE(AE) | 2012/02/09 * 12 |
| MTA-31 | Terminator | TME | CT-01 | - | CE | 2012/01/11 * 12 |
| MAT-67 | Attenuator(13dB) | JFW Industries, Inc. | 50FP-013H2 N | - | CE | 2012/01/28 * 12 |
| MCC-113 | Coaxial cable | Fujikura/Suhner/TSJ | 5D-2W(10m)/ SFM141(5m)/421- 010(1m)/suciform141- PE(1m)/RFM- E121(Switcher) | -/04178 | CE | 2011/07/04 * 12 |

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

**Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test**

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